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Canada Ponders Labor and Power Problems

With Newsprint Mills Now Operating At Slightly Over 60 Per Cent Committee Will Determine How Much Manpower Can Be Shifted To War Work—Power Shortages Discussed—Other News.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., August 31, 1942—Problems of manpower and hydro-electric power are for the moment the chief items of concern in the pulp and paper industry. In regard to the former, the National Selective Service Director, Elliott M. Little, who is himself an experienced newsprint executive, has announced that the advisory committee on man power problems in the pulp and paper industry has been asked to determine how many men can be transferred from that industry without dislocation. At present he holds that with newsprint mills running at little over 60% of capacity, there is a waste in the industry of man power, with many of the men working only part time. The committee has been asked to determine how many men working full time are required to produce the pulp and paper necessary to meet the demand and how many men can be released for essential war work, and to recommend the principle and conditions of transfer. The committee is composed of ten members, five representing management and five representing employees.

Shortages of Power Are Developing

With respect to hydro-electric power, the most serious shortages that are developing are in Ontario and Quebec, where 80% of Canada's power resources, and also the bulk of her industries, are located. The shortage is becoming acute in southern Ontario, and it is possible that some of the orders received by paper mills there will be transferred elsewhere. In Quebec the increased war demands have been largely met by diverting secondary power, which dropped from a supply of 3,641,447,000 kilowatt hours in 1940 to 1,947,160,000 in 1941. Officials say that it is unlikely that much more secondary power can be diverted in the province, and describe the situation as "tight." For the country as a whole increases in power supply have been obtained by utilizing installations held in reserve at the outbreak of the war, improving water flow, installing additional generator equipment at about the normal peace-time rate, and diverting to war industries large amounts of power used for the secondary purpose of raising steam in electric boilers, mostly in the pulp and paper industry. A number of new installations are also being brought into production as fast as possible. It is not expected that the power situation will become serious before October, when the power requirement line begins to climb to its annual December peak. The officials say this expected power shortage can only be met by cutting down on normal use. The first steps will probably take the form of restrictions on "luxury" power. Some time during the present month it is expected that showcase and ornamental lighting will drop out of the picture, air heaters in stores and offices will go on the shelf for the duration, and street lighting will be curtailed.

No Electric Power Shortage Now

Meanwhile as far as Quebec is concerned, the definite statement is made by a Provincial Government official that at present there is no shortage of electric power in the province and that, given at least average water levels and no "unusually large" demands for power, it is not expected that a shortage will develop in the near future. Oliver Lefebvre, vice-president of the Quebec Streams Commission, who is the authority for this statement, says that the capacity of the existing plants is not such as would enable an increase as heavy as that of 1941 to be met, but in the meantime there is no question of a power shortage.

Ceiling Prices on Publications Lifted

The over-all ceiling price on Canadian and imported newspapers and periodical publications in general has been lifted by the Wartime Prices and Trade Board, leaving the press "free to adjust rates and safeguard its revenues." The exemption applies to newsstand and street sales prices, subscription rates and advertising rates.

In announcing its decision, the board said a careful survey by the administrator of publishing, printing and allied industries showed that while larger revenues had offset higher operating costs in 1940 and 1941, revenues recently had suffered a "serious decline."

(Continued on page 27)

Large Plantings of Pulpwood Trees Thriving

Wisconsin Commission Reports Handling 20 Million Trees In Planting Season—Mills Accumulate Heavy Stocks of Pulpwood—J. R. Diggs Appointed To OPA Paper Committee — Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., August 31, 1942—New pulpwood plantings in Wisconsin have been given a favorable start and good rooting because of ample rains and fortunate weather conditions this summer, auguring for a generous supply for the future, according to C. L. Harrington, superintendent of forests for the Wisconsin Conservation Commission.

Mr. Harrington points out that 20,000,000 trees were handled during the planting season. More than 8,000,000 were planted in county forests, 3,500,000 on farm woodlots, 5,225,000 on private lands operated by paper mills and others, and the remainder along highways or for special uses.

Fears of a labor shortage were overcome despite discontinuance of Civilian Conservation Corps camps, but by cooperation with other agencies the plantings were accomplished.

Mills have been stocking up heavily with pulpwood all summer in anticipation of transportation shortage, and loading crews have operated seven days a week. A larger amount than usual was moved across Lake Superior by raft for the Consolidated Water Power and Paper Company, for loading and reshipment by rail.

Curtailed operations in some mills have depressed pulpwood prices slightly over the last six months, a survey by the foresters of the University of Wisconsin extension department reveals. Otherwise, logs have commanded higher prices than usual due to war demands for lumber.

Kimberly-Clark Workers Hold Outing

A large crowd attended the annual picnic of the Kimberly Mill Workers Union at the village park at Kimberly, Wis., Sunday afternoon, August 23. The union is made up of employees of the Kimberly-Clark Corporation. Amusements and a midway featured the gathering, and in the evening a dance was held at the mill clubhouse. Children were given tickets for free refreshments.

Marathcn Distributes Defense Charts

The Menasha Products division of the Marathon Paper Mills Company, Menasha, Wis., has distributed wall charts to all of its employees to be placed in their homes. The charts carry information on civilian defense, with instructions concerning blackouts, raids, etc., as well as showing the civilian defense insignias. First aid instructions also are given.

R. F. Bellack Made Director

R. F. Bellack, executive vice-president of the Fox River Paper Corporation, has been appointed a director of the Chamber of Commerce at Appleton, Wis. He fills the unexpired term of a director who had resigned.

J. R. Diggs Appointed By OPA

John R. Diggs of the Mosinee Paper Mills Company, Mosinee, Wis., has been appointed a member of the kraft paper advisory committee of the Office of Price Administration. Announcement of his appointment was made by the Wisconsin branch of the Office of War Information. The group will cooperate with the OPA in solution of the industry's price problems.

Daughter of C. H. Sage Enlists

Miss Jeanne Sage, daughter of C. H. Sage, vice-president of Kimberly-Clark Corporation, Neenah, Wis., has enlisted as a midshipman in the WAVES, the women's naval reserve. She will train for the officers' corps. Miss Sage has been an ardent yachting enthusiast, operating her own sailboat, the Cantagree, in various cup races.

Finalists in Mill Golf Contests

Tryg Lund has entered the finals in the Shattuck flight of the annual Kimberly-Clark Corporation golf tournament, by defeating Al Hopkins 7 to 5. Fred Hollinbeck and E. Weitzel are finalists in the Mahler flight, and Ray Otton and Milton Remmel in the K.C.A. flight.

Robert Stark has entered the semi-finals in the F. J. Sensenbrenner flight, through a 4 to 3 victory over Clifford Burton.

Nuptials in the Paper Industry

Edward W. Krautkramer, head of the sales department of the Sawyer Paper Company, Neenah, Wis., and Miss Cornelia Hauser of Neenah, were married August 22 at St. Patrick church, Menasha, Wis. A wedding dinner was served at the Valley Inn.

Edward May, a member of the technical staff of Kimberly-Clark Corporation's mill at Niagara, Wis., and Miss Joyce Grenier were married August 22 at St. Joseph church, Marinette, Wis. Mr. May is a graduate of the Lane Technical school, Chicago.

Harold Moorhead Goes To Powell River

VANCOUVER, B. C., August 29, 1942—Harold Moorhead has now arrived at Powell River, B. C. to assume his new duties as resident engineer at the pulp and paper mill of the Powell River Company. Mr. Moorhead graduated as a mechanical engineer from the University of British Columbia in 1933, and since then has been closely affiliated with the pulp and paper industry. He was employed for three years on the engineering staff of the B. C. Pulp & Paper Company at Port Alice, B. C.

Since 1936 Mr. Moorhead has been in Eastern Canada. He worked on the engineering staff of the Quebec North Shore Paper Company on construction of their plant at Baie Comeau. On completion of construction there he accepted a post with the engineering department of the Ontario Paper Company's mill at Thorold, and left there to assume his new post at Powell River.

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RELIANCE A-C D-C MOTORS

Chicago Reports Paper Market Is Spotty

Demand Improving In Some Lines With Indications That Large Buyers May Place Orders Soon — N.P.T.A. To Hold Regional Meetings This Week—Salesmen Hold Golf Outing—Other News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., August 31, 1942—The paper market in the Chicago area gave minor signs of better days ahead, during the week just closed. A spotty condition developed wherein some lines indicated that demand had materially improved while other lines continued in an obviously "over-bought" condition. Hesitancy on the part of some buyers was being overcome by the action of larger buyers who were reported as indicating that now was a good time to replenish inventories. Some grades of sulphite were reported more active and, in some quarters, krafts were becoming more active. Groundwoods and newsprints had slight indication of improvement coming in the form of inquiries. Books and covers remained little changed. The waste paper market, waiting for the "turn of the month" developments, simply had "excellent prospects for getting better," as one local waste paper expert put it.

N.P.T.A. Regional Meeting Here

Chicago is, after all, to be the scene of its usual fall activities as far as the paper trade is concerned. Denied the use of the Hotel Stevens which is now housing the armed forces, and cancelling the Fall Meeting of the N.P.T.A. for various reasons, the industry is going to focus attention on a regional conference to be held at the Palmer House on next Wednesday and Thursday, September 2 and 3. The Chicago meetings will, however, not be the only regional conferences as N.P.T.A. executives will move to other cities to discuss the Price Order, WPB regulations and the general situation as it confronts the industry today. Things are in a sufficiently critical condition—not a small share of which is due to an over-dose of "conservation"—that N.P.T.A. leaders here look for a very good attendance next week. To make the event seem even more like a Fall conference, the Paper and Twine Club is expected to call its enthusiastic members together and coarse and fine paper meetings are likewise expected to appear on the calendar. Even the annual golf outing, heretofore a feature of the western division of the Salesmen's Association of the Paper Industry calendar, will be held though under different sponsorship. The Chicago Paper Association's annual outing at the Tam-O-Shanter Golf Club on September 3 will be used as the high spot of the entertainment program for out of town guests with officers of the Chicago Paper Association working on elaborate plans coinciding with the business part of the two day conference. It is expected that manufacturers, sales representatives, distributors and all factors of the trade will make Chicago their headquarters next week simply because of the genuine necessity of "clearing information" at a very critical time.

Salesmen Golf Prize Winners

While quite a number of paper salesmen may have to wait next year to collect golf prizes, the list at the final outing at Bob-O-Link is long and impressive indeed. Staged as the "windup" event, the August 21 golf party sponsored by the Salesmen's Association, attracted a good crowd and found Gwin Olson of the Nackie Paper Company, Milwaukee, on top as low gross winner. Gene Hammes, Graham Paper Company, was the runner up. Other winners: first low net, F. Huff, Central Tag Company; second low net, Ira Stoller, Randolph Bag and Paper Company; third low net, A. B. Tucker, Parker, Thomas & Tucker; fourth low net, Alex Shennen, International Tag and Salesbook Company; fifth low net, M. T. Fortney, Butler Paper Company; first low net, first 9, Bill Carr, Detroit Sulphite Pulp and Paper Company; second low net, 1st 9, W. Lesser, American Can Company, first low net, 2nd 9, F. X. Brucker, Hartford City Paper Company; second low net, 2nd 9, C. Atwood, Atwood Paper Company, first 9 low putts, Frank Foley, Blandin Paper Company and second low putts, R. O. Warner, M. & O. Paper Company. The high gross foursome was composed of Ed Bishop, H. Berge, Hank Fulton and John Strobbe. Low net foursome honors went to H. M. Early, F. Huff, Burt Fisher and T. Ward while low putt foursome honors were copped by E. R. Neblett, Gene Hammes, Frank Foley and M. T. Fortney. The blind bogey was won by Frank Brucker. It was the successful wind-up event for Ray George, Tomahawk Paper Company, chairman of the golf outings.

List OPA Appointments

Two well known Chicago coarse paper executives are listed with the eleven men recently appointed by the Office of Price Administration to work on kraft paper problems with particular emphasis on price matters. Both Chicago leaders are on the Kraft Grocers and Variety Bag Advisory Committee. They are Mr. W. R. Kohl of the Lincoln Bag Company, and Mr. W. J. Henry, Southern Advance Bag & Paper Company.

OPA Price Heads at New Office

All members of the paper industry operating in the Chicago Metropolitan area are now requested to direct all of their questions on the General Maximum Price Order to the Chicago offices at 228 N. LaSalle street. Until recently all price queries were directed to the regional offices at 20 North Wacker Drive. The new offices mean a direct coordination of Chicago activities with Chicago price executives trained in specific lines of endeavor. Under the direction of Dr. E. P. Hohman, Chicago price control executive a group of men have been gathered together who have actual experience in business. Included in the group is William K. Kidder who is in charge of supervision of price schedules in the Chicago area of OPA and who also has charge of matters pertaining to chemical prices. Dr. Hohman has pointed out that the sending of inquiries to the 288 N. LaSalle office will mean speed in adjustments, "relief" cases and in dissemination of general information.

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Ontario Expecting Power Rationing Soon

Plans Now Being Completed Are Expected To Become Effective About October 1 For Pulp and Paper Mills In Certain Areas — Extent of Probable Power Diversion Is Unknown — Other News.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., August 31, 1942—While a definite date has not yet been set by the power controller for the cutting down of the non-essential use of hydro electrical power and the diversion of power from some industries in certain sections of the Dominion, to places where it will have a greater effect on the war effort, it is expected that plans that have been under way for months will be completed by September 20 and that about October 1 will come into effect for the pulp and paper industry in certain areas.

The pulp and paper industry is working out a central control system to take care of the re-allotment of power, particularly for the newsprint division. Some of the Quebec and Ontario mills will be asked to give up power, particularly those in the Saguenay, St. Maurice Valley, Ottawa-Gatineau, eastern and southwestern Ontario. Mills in these districts have an annual capacity of 2,350,000 tons of newsprint, or better than half of that for the whole industry. Working at capacity, Quebec mills require 615,000 h.p. and those in Ontario 145,000 or a total of 760,000 h.p. At present these mills are working at about 60-65% capacity and consuming about a half million h.p.

To Restrict Electricity for Display

Commercial lighting and advertising signs will both be restricted in the use of electrical energy and consideration is being given to the domestic use of electricity. In Ontario domestic consumption of electrical energy is a real factor, but is not of such importance in Quebec. There is already some restrictions on the use of electricity, but other restrictions will be necessary.

The crux of the problem is to supply the constantly growing aluminum industry with power, not so much to drive its machinery, but for heating and processing the ores necessary. As an indication of the vast quantities of electricity required by this new industry, it may be said that an ordinary industrial plant may use 25 h.p. and a plant using 100 h.p. is regarded as a large power user. One of the largest war plants in the country uses 4,000 h.p. In electrochemical or electro-metallurgical operations, a single aluminum pot room will use as much as 40,000 h.p. How many times this huge amount will be multiplied before all the planned aluminum production has been reached is probably known only to the war industries board.

The newsprint industry, while taking second place to the aluminum industry in its use of electrical energy, seems to be the only source of power capable of supplying the great requirements through diversion.

It is said that it requires 100 h.p. of electrical energy for every ton of newsprint produced. In 1940 the pulp and paper industry used 1,986,667 h.p. of electrical energy. Not all this was supplied by central power stations, as the industry has a substantial power capacity in its private installations, but the industry bought $17,345,301 worth of electrical energy from central plants that year.

Deliveries of energy for use in electric boilers have been drastically curtailed. Consumption has dropped from 3,381,447 thousand killowatt hours of energy in 1940 to 2,579,445 thousand kilowatt hours in 1941 and 1,378,000 for the first six months of this year. Since the industry was notified of the necessity for curtailment, many operators have installed coal-fired steam plants.

Extent of Power Diversion Unknown

Just how much electrical energy has already been diverted from the pulp and paper industry is not known, but the industry can, because of lowered operations, give up considerable more. It happens that most of the energy required by the plants in the areas affected is supplied from central stations, but it is not a simple problem of cutting off energy here and applying it there. Every pulp mill must maintain huge stocks of wood and this wood is not easily shifted from place to place. It is not expected that there will be any great upheaval within the industry due to the regulations about to come into force. Considerable thought and much planning has been given the problem. When the changeover comes, about the first of October, the industry should be prepared to do its part. All plants will be affected to some degree, either directly or indirectly, and it is expected that adjustments will have to be made from time to time.

Government Cuts Stationery Supplies

Effective immediately, Hon. J. T. Thorson, minister of war services, announced this week the start of drastic government economies in the use of paper and supplies and the printing and distribution of government books, pamphlets, bulletins, etc. A director of government office economies control has been established with Col. John Thompson named to the post.

Columbia Div. Moves to New York

[FROM OUR REGULAR CORRESPONDENT]

PITTSBURGH, September 1, 1942 — The executive sales office of the Columbia Chemical Division of the Pittsburgh Plate Glass Company has been moved to Pittsburgh from New York, vice president E. T. Asplundh announced today. Also involved in the transfer are the chemical division's traffic and advertising departments.

"The move," Mr. Asplundh said, "is a continuation of the Company's program of co-ordinating its various divisions in the general office at Pittsburgh. Several years ago the executive office of the paint division was moved here from Milwaukee.

"Mr. W. I. Gallher, director of sales of the chemical division, will be in charge of sales activities from the new Pittsburgh headquarters."

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America is a greater land of promise today than when the first pioneer saw a dream of the future in the mists of Niagara. New ways, new methods, new conceptions of how man may progress and expand under the doctrine of freedom can be seen today. The world will follow the steadfast, dynamic way of America to a new era. For the power of free men is as boundless as the power of Niagara—and as resistless as the flow of the river over its sharp cliffs.

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Government Paper Bids & Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 2, 1942 — The Government Printing Office has received the following bids for 2,000 sheets of 25 x 38, 100% rag, kraft paraffine manila paper: Mathers-Lamm Paper Company, 14.00 cents; and R. P. Andrews Paper Company, 10 cents.

For 5,000 pounds of back lining paper for case-making machines in 37-inch rolls: Barton, Duer & Koch Paper Company, 4.44 cents; R. P. Andrews Paper Company, 3.57 cents; Mather-Lamm Paper Company, 3.9 cents; and Stanford Paper Company, 4.00 cents.

For 46,000 pounds of Buff Sulphite Writing Paper, 32 x 42, bids per pound received were: R. P. Andrews Paper Company, .0683 cents; the Barton, Duer and Koch Paper Company, .0662 cents; the Baxter Paper Company, .0690 cents; the Butler Company, .0644 cents; the Central Ohio Paper Company, .0659 cents; Eastern Corporation, .0672 cents; Graham Paper Company, .0725 cents; Marquette Paper Company, .0679 cents; the Mudge Paper Company, .0678 cents; the Old Dominion Paper Company, .06939 cents; Paper Corporation of the United States, .0647 cents; Perkins-Goodwin Company, .0650 cents; Resolute Paper Products Corporation, .06125 cents; Stanford Paper Company, .0638 cents; Walker Goulard Plehn Company, Inc., .074 cents; Whitaker Paper Company, .0683 cents; Wilcox-Welter-Furlong Paper Company, .0650 cents; Bulkley, Dunton & Co., .07 cents; the Mead Sales Company, .0662 cents; Bermingham and Prosser Company, .0680 cents; Coy, Hunt and Company, .0641 cents; St. Regis Paper Company, .0675 cents; Fitchburg Paper Company, .0612 cents.

R. P. Andrews Paper Company has been awarded the contract for furnishing the Government Printing Office with 9,447 pounds of white sulphite ledger paper at $7.47 per cwt. Other paper awards just announced include the following:

R. P. Andrews Paper Company will also furnish 468,000 pounds of white ground wood mimeograph paper at $4.84 per cwt., and the Marquette Paper Company will furnish 211,250 pounds of white offset paper at 5.51 cents. The same company will also furnish 119,600 pounds of same at 5.36 cents.

Whitaker Paper Company will furnish 6,000 sheets of 100% rag, smooth finish mourning paper at $13.55 per M sheets, and Coy Hunt & Company will furnish 192,000 pounds of supercalendered book paper at $4.98 per cwt. Barton, Duer & Koch Paper Company will furnish 12,500 pounds of 50% rag, pink ledger paper at 22 cents and Marquette Paper Company will furnish 52,234 pounds of 50% rag, white ledger paper at 11.90 cents. Marquette Paper Company will also furnish 7,670 pounds of Quaker drab cover paper at 6.94 cents.

Barton, Duer & Koch Company will furnish 185,500 pounds of white 50% rag, index paper at $11.76 per cwt., and R. P. Andrews Paper Company will furnish 11,564 pounds of high finish salmon sulphite tag board at $8.25 per cwt. Barton, Duer & Koch Paper Company will furnish 2,000 sheets of mist gray photomount board at $49.00 per M sheets; also 288 pounds of green sulphite writing paper at 10.90 cents and 130 pounds of blue same at 10.90 cents and 1,560 pounds of 25% rag, white bond paper at 17.5 cents.

R. P. Andrews Paper Company will furnish 8,100 pounds of white offset paper at 7 cents. Aetna Paper Company will furnish 24,050 pounds of 25% rag, white bond paper at 10.58 cents and the same firm will also furnish 3,835 pounds of 25% rag, same at 10.78 cents. Whiting-Patterson Paper Company will furnish 5,454 pounds of 25% rag, yellow bond paper at 10.25 cents and Garrett Buchanan Company will furnish 11,804 pounds of 25% rag, same at 11.61 cents.

Barton, Duer & Koch Paper Company will furnish 1,040 pounds of 25% rag, green bond paper at 18.5 cents and the same firm will also furnish 1,014 pounds of same white at 17.5 cents. Nashua Gummed & Coated Paper Company will furnish 10,000 sheets of glazed paper red one side at $8.36 per M sheets.

R. P. Andrews Paper Company will furnish 200,000 pounds of wood manila paper at 4.64 cents and Bermingham & Prosser Company will furnish 382,300 pounds of wood mail paper at 3.93 cents. R. P. Andrews Paper Company will also furnish 50,000 pounds same at 4.64 cents.

Marquette Paper Corporation will furnish 54,500 pounds of white offset paper at 5.36 cents and the Aetna Paper Company will furnish 7,379 pounds of 25% rag, salmon bond paper at 13.93 cents. Marquette Paper Company will also furnish 19,400 pounds of buff sulphite index paper at 6.53 cents. The same firm will also furnish 22,015 pounds of Quaker drab cover paper at 6.94 cents and Frank Parsons Paper Company will furnish 54,500 pounds of white offset paper at 5.67 cents. Marquette Paper Company will also furnish 59,000 pounds of 25% rag, yellow bond paper at 13.40 cents.

Quebec Pulp Negotiations On

MONTREAL, Que., September 1, 1942—Negotiations between interested parties in the Quebec Pulp and Paper Corporation situation continue and it appears that something concrete may be achieved in the near future. A recent development, it is understood, has been a request by the Provincial Government to Consolidated Paper Corporation and Price Bros., which jointly hold all the outstanding common shares of the corporation (100,000 shares n.p.v.), to turn over such shares to the Provincial Government, which is a creditor of the corporation in the amount of about $1.8 millions. Pending the outcome of the negotiations on which the Provincial Government, the two shareholders and the Aluminum Company are now engaged, it is stated that the Preferred Shareholders Protective Committee has again agreed to defer any winding-up proceedings against the corporation. Following its formation early this month, the committee served notice on the corporation of intention to institute winding-up proceedings, but acceded to a request for a delay until August 15. On the expiration of that delay, a request for a further delay was made and this request was supported by the Minister of Lands and Forests. The further delay was granted but it is understood that the Committee's counsel is being kept informed of the progress of the negotiations. The mills of the company (now idle) are at Chicoutimi, Que.

Obituary

Martin Griffin

Martin Luther Griffin, 83, pioneer in the wood pulp industry and retired consulting chemist, died Friday night, August 28, at his residence at Prospect place, Taunton, Mass.

Born in Northampton, Mass., he established a paper laboratory in Holyoke after receiving his master's degree in 1886 at Amherst, becoming one of the first chemists in the industry.

After years in Holyoke, he entered the employ of large manufacturers, including the West Virginia Pulp & Paper Company, the Oxford Paper Company of Rumford, Me., and the Champion Fibre Company of North Carolina.

In 1919, he came to the Mt. Hope Finishing Company at North Dighton, as chief chemist. He was a member of the American Chemical Society, the Society of Chemical Industry (London), the Technical Association of the pulp and paper industry, the American Society of Textile Chemists and Colorists, and the American Mining and Metallurgical Engineers.

He was a member of the Segregansett Country Club, the former Winthrop Club, and the Chemist's Club and Amherst Club of New York. For many years he was a member and deacon of the Broadway Trinitarian Congregational Church.

He leaves his widow, Mrs. Ada (Riggs) Griffin; two sons, Archer Estabrook Griffin of Wilmington, Del., and Carroll Riggs Griffin of New York, and a sister, Mrs. William G. Lee of Sacramento, Cal.

The funeral was held September 1 at the Broadway Congregational Church, Taunton.

Jackson Townsend

[FROM OUR REGULAR CORRESPONDENT]

GLENS FALLS, N. Y., Aug. 31, 1942—Jackson Townsend, president of the Wood Flong Corp., died this week following a complication of illnesses from which he had suffered for some time. A pioneer in the development of dry mats for newspaper stereotyping, he had been a leader in the industry since 1915 at which time the concern was organized in the village of Stillwater. He became president of the concern which by 1929 has outgrown its original site and move to Hoosick Falls where the old Walter A. Wood plant was transformed into a modern mat making mill with capacity to supply thousands of newspapers, news syndicates, and other printer customers in this country and abroad. Following his graduation from the University of North Carolina, he done research and manufacturing work for the naval stores and later was employed as chemical engineer with the Pyntree Paper Co., of Macon, Ga. Later he became consulting engineer with Arthur D. Little, Inc., of Cambridge, Mass. While a resident of this section, he was a director of the First National Bank, of Mechanicville, president of the Stillwater Board of Education, president of the Rotary Club of Mechanicville and a member of the board of directors of the Mechanicville Country Club. In recent years he was also a director of the Peoples' First National Bank, of Hoosick Falls, and the Mary McClelland Hospital, Cambridge. In 1936 he was elected a director of the Green Mountain Junior College at Poultney, Vt., and later became chairman of the board. He established the Townsend Memorial Fund several years ago, contributing the funds which permitted an increasing number of young men and women to attend college. The principal survivors are a daughter, two sons, two brothers and a sister.

Charles W. Vernon, Jr.

Charles W. Vernon Jr., partner in the firm of Vernon Brothers & Co., wholesale paper distributors at 66 Duane st, New York, died August 22 at his home at 65 Brookfield road, Upper Montclair. He was fifty-six years old. Mr. Vernon was graduated from Princeton University in 1908 and was admitted to the New York bar in 1912. He was a member of the Princeton Club in New York and was treasurer of the National Paper Trade Association. Surviving are his wife, Mrs. Sionag Douglas Vernon; a daughter, Mrs. Sionag Douglas Black; a son, Charles W. Vernon 3d, and a sister, Mrs. Mable Muchmore, of South Orange, N. J.

May Decide Container Question Soon

The three and one-half year battle over the question whether paper milk containers are standard milk bottles may be decided next month—at least as far as Chicago is concerned. At that time the State Appellate Court will hear the city's plea to set aside an injunction under which milk is now sold in paper containers. All this follows after the U. S. Supreme Court refused to rule on the question of whether or not containers were not standard milk bottles within the meaning of Chicago's city ordinance. Behind the controversy is the real question of "home rule" for Chicago as compared to State control. The entire battle goes back to January, 1939, when the Board of Health refused to let a local dairy use paper containers. Injunctions followed, the months and years sped by and now Chicago's citizens who long ago decided in favor of the paper milk container are hoping that—very soon—they will hear the last of this fight.

Henderson Warns Paper Merchants

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 2, 1942 — Leon Henderson has warned paper merchants dealing in kraft wrapping and kraft bag papers that addition of manufacturers' zone and quantity differentials in certain sales of less than carload lots is illegal under Maximum Price Regulation No. 182. The regulation established specific price differentials for manufacturers' sales of less than carload lots and provides that these may be passed on by the merchant to his purchaser only in those cases where the merchant himself paid differential to the manufacturer.

The regulation allows manufacturers to add twenty-five cents per hundred weight on orders of less than 20,000 pounds and twelve and one-half cents per hundred weight on orders of 20,000 pounds to a carload. No differentials are provided for carload lot orders.

Hammermill Agents Hold Conference

Award of the Army-Navy "E" Pennant to the Hammermill Paper Company was announced at that company's Thirty-First Annual Conference with its agents in Erie the last week in August. In making the announcement Hammermill's president, Norman W. Wilson, emphasized that this is the first time the award has been made to any concern in the paper industry, and that Hammermill is only the forty-ninth concern in the entire nation to be so honored.

General business sessions at the conference were held at Erie's Kahkwa Club on Thursday and Friday, August 27 and 28, with President Norman W. Wilson presiding. Talks were given by Bruce Barton, nationally known advertising executive and writer; Donald S. Leslie, Hammermill's first vice-president and assistant general manager; and Harrison R. Baldwin, vice-president in charge of sales.

Mr. Wilson emphasized that shoulder to shoulder with the war duties of Hammermill and its agents is a mutual obligation to keep production and selling units alive. The war, he pointed out, will not be won without going concerns and employed individuals to support it. At the conclusion of Thursday's business meeting, Mr. Baldwin presented certificates of sales achievement to twenty-one different Hammermill merchants, climaxing his presentations with Grand Championship Awards to the three merchants whose sales were outstanding for all Hammermill lines.

The Friday business session was devoted chiefly to discussion of the possible contributions of paper and printing to winning the war. A. Ellis Frampton, Hammermill's advertising manager and assistant general sales manager, demonstrated how Hammermill's advertising is pointing out the service of paper to war-time management and promised the continuation of the kind of advertising that has been a part of Hammermill's merchandising for over thirty years.

New this year in the history of the conference was the establishment of a permanent Agents' Paper Committee comprised of nine representatives of Hammermill agencies. This new group absorbs the members of the former Agents' Advertising Committee. The following were elected to this new committee: C. R. Smith, Van Reed Paper Company, Reading, Pa.; Hugh G. Boyer, Caskie Paper Company, Inc., Lynchburg, Va.; C. S. Lafferty, Beacon Paper Company, St. Louis, Mo.; Frederick P. Appleton, Miller & Wright Paper Company, New York, N. Y.; S. B. Gaines, The Capital City Paper Company, Springfield, Ill.; Ernest C. Mead, Richmond Paper Company, Inc., Richmond, Va.; Josef H. Buerger, The Alling & Cory Company, Pittsburgh, Pa.; Ralph R. Moser, Carpenter Paper Company, Oklahoma City, Okla., and W. L. Shea, Bradner Smith & Company, Chicago, Ill.

J. Fred Wuenschel, Hammermill district sales manager for the Pacific Coast, reported briefly at the Friday meeting on war work at the Grays Harbor Pulp & Paper Company at Hoquiam, Wash.

The Agents' Advisory Committee met on Wednesday at Weigelia Lodge, the country home of Norman Wilson. Committee members in attendance were Chairman R. M. Harris, The Alling & Cory Company, Rochester, N. Y.; A. W. Green, Green & Low Paper Company, New York, N. Y.; T. H. Epes, Epes-Fitzgerald Paper Company, Richmond, Va.; George S. Clark, Hudson Valley Paper Company, Albany, N. Y.; E. L. Walters, Western Newspaper Union, Omaha, Neb.; A. D. Cleveland, E. C. Palmer & Co., Ltd., New Orleans; C. R. Braatsch, Chicago Paper Company, Chicago, Ill., who substituted for W. N. Gillett of the same firm; H. F. Petrequin, The Petrequin Paper Company, Cleveland, Ohio; Frank W. Holden, The Rourke-Eno Paper Company, Hartford, Conn.; Victor E. Hecht, Zellerbach Paper Company, San Francisco, Cal.

The following Hammermill Agents were elected to the Advisory Committee to replace members whose terms have expired: Charles A. Esty, Carter, Rice & Company Corp., Boston, Mass.; George F. Gray, Henry Lindenmeyr & Sons, New York, N. Y.; Robert S. Johnston, Old Dominion Paper Company, Norfolk, Va.

Dr. R. A. Diehm to be Technical Director

Walter P. Paepcke, president of Container Corporation, has just announced the appointment of Dr. Robert A. Diehm as technical director.

Dr. Diehm comes to Container Corporation from the Rohm and Haas Company of Philadelphia where he devoted his time to research problems from 1929 to 1937 and to sales problems of a technical nature until July of this year. The new technical director of Container Corporation received his B.S. degree in

Dr. Robert A. Diehm

Chemistry and Physics from Purdue University in 1926, M.S. in Microbiology from Rutgers in 1928, and Ph.D. from the same school in 1930. While doing post-graduate work he taught at the New Jersey College for Women at New Brunswick, N. J., from 1928 to 1929, and he was research assistant at Rutgers from 1926 to 1929.

Dr. Diehm is a member of the Sigma Xi and Ceres (honorary Fraternities) and was a nominee for the John Wesley Hyatt Award for Plastic Developments in 1941. He is also a member of the Technical Association of the Paper and Pulp Industry and the American Chemical Society.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending Aug. 29, 1942

STOCKS

	High	Low	Last
A. P. W.	1¼	1¼	1¼
Armstrong Cork Co.	25¾	25	25½
Celotex Corp.	6½	6¼	6⅜
Celotex Corp., pf.	79	69⅝	69⅝
Certain-Teed Products Corp.	2	1⅞	1⅞
Certain-Teed Products Corp., pf.	26¾	25¼	25½
Champion Paper & Fibre Co.	....	....	....
Champion Paper & Fibre Co., pf.	....	....	....
Congoleum Nairn Co.	16¼	15⅞	16⅛
Container Corp. of America	12¼	12	12
Continental-Diamond Fibre Co.	6½	6¼	6¼
Crown-Zellerbach Co.	11¼	10¾	10¾
Crown-Zellerbach Co., pf.	83	83	83
Dixie-Vortex Co.	8¾	8⅜	8⅜
Dixie-Vortex Co.—A.	36¾	36½	36½
Flintkote Co.	11⅜	11	11⅛
Robert Gair	1¾	1⅝	1⅝
Robert Gair, pf.	....	....	....
International Paper Co.	9	8⅝	8¾
International Paper Co., pf.	48¼	46	46¼
Johns-Manville Corp.	58½	57	58
Johns-Manville Corp., pf.	126½	125½	125½
Kimberly Clark Corp.	25¾	25¾	25¾
MacAndrews & Forbes	17	17	17
MacAndrews & Forbes, pf.	....	....	26¼
Masonite Corp.	26¼	25¾	26¼
Mead Corp.	6¾	6⅝	6¾
Mead Corp., pf.	....	....	....
Paraffine Companies, Inc.	....	....	....
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	8⅞	8⅝	8⅝
Rayonier, Inc., pf.	26½	25½	25½
Ruberoid Co.	17⅞	17¾	17⅞
Scott Paper Co.	34⅜	33½	33½
Scott Paper Co., pf.	111	110¾	111
Sutherland Paper Co.	....	....	....
Union Bag & Paper Corp.	8¾	7⅞	7⅞
United Paperboard Co.	3⅛	3	3
U. S. Gypsum Co.	52	50½	52
U. S. Gypsum Co., pf.	171½	171½	171½
West Virginia Pulp & Paper Co.	13⅜	12⅞	12⅞

BONDS

Abitibi Pulp & Paper Co. 5s '53	69¼	69¼	69¼
Celotex Corp. 4½s '47	98¼	98¼	98¼
Certain-Teed Products Corp. 5½s '48	89⅝	89	89
Champion Paper & Fibre Co. 4¾s '50	....	....	....
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	104¼	104¼	104¼
International Paper Co. 5s '47	104½	103¾	104½
Mead Corp. 4½s '55	....	....	....
West Virginia Pulp & Paper Co. 3s '54	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending Aug. 29, 1942

STOCKS

	High	Low	Last
American Box Board Co.	....	....	....
Brown Co., pf.	....	....	....
Great Northern Paper Co.	27½	27¼	27½
Hummel-Ross Fibre Corp.	3⅛	3	3
National Container Corp.	8¼	8	8
St. Regis Paper Co.	1¼	1¼	1¼
St. Regis Paper Co., pf.	110	110	110
Taggart Corp.	2¾	2¾	2¾

BONDS

American Writing Paper Co. 6s '61	....	....	....

Standard Votes Dividend

Directors of the Standard Paper Manufacturing Company, Richmond, Va., have declared a quarterly dividend of 1½% on Standard's $50 par value 6% preferred stock, it was announced by W. Byron Taylor, secretary-treasurer of the company. The dividend will be payable October 1 to stockholders of record September 15.

Schumacher Profits Off

The Schumacher Wall Board Corporation for the quarter to July 31, reports a net income of $32,665, equal after preferred dividends to 28 cents each on 66,000 common shares, against $68,648, or 73 cents a common share last year.

Paraffine Companies Net $3.62

The Paraffine Companies, Inc., for the fiscal year ended June 30, 1942, after provision for depreciation, all taxes and other charges, and after providing a reserve of $500,000.00 for possible losses arising out of contingencies not now definitely ascertainable, reports earnings amounted to $1,816,730.27, compared with $1,600,038.34 in the previous fiscal year.

Earnings on common stock, after provision for preferred dividends, amounted to $3.62 a share compared with $3.16 in the previous fiscal year.

Federal taxes, computed on the basis of the present tax law, were approximately two and three-quarter times those of the previous year.

Sales volume for the year was the highest in the history of the company, according to William H. Lowe, president, representing an increase of approximately 30% over the previous sales record year ending June 30, 1941. This was largely due, Lowe said, to increase in volume of national defense expenditures in all lines of products.

Regular quarterly dividends of $1 per share on Preferred Stock aggregating $95,216.00 and dividends on the Common Stock of $2 per share aggregating $925,026.00 were paid during the year.

Rayonier Nets 18 Cents

Rayonier, Inc., and wholly owned subsidiary for the quarter to July 31, reports a net profit after $1,376,441 provision for Federal income and excess profits taxes of $482,992, equal after preferred dividend requirements to 18 cents each on 963,871 common shares, against $834,983, or 54 cents a common share after $1,209,337 provision for taxes, last year. Income tax provisions were computed on the basis of latest information available as to proposed Revenue Bill of 1942.

Crown Zellerbach Loses

The Crown Zellerbach Corporation and subsidiaries report for the three months ended on July 31, first quarter of its new fiscal year, net profits of $1,803,147 after all charges, provision for Federal taxes and minority interest. This was equal, after preferred dividend requirements, to 50 cents a share on the outstanding common stock. It compares with net profits of $2,309,135, or 73 cents a common share, in the corresponding period last year.

Hinde-Dauch Profits Up

The Hinde & Dauch Paper Company and consolidated domestic subsidiary for the six months to June 30, reports a net profit of $453,621, or $1.01 a common share, against $432,900, or 95 cents a common share, last year. Provision for estimated Federal taxes, including Federal income and surtaxes at 40% rate and excess profits tax at 94%, amount to $1,650,000, compared with revised tax provision of $582,600 for 1941 period.

To Confer on Manpower

The War Manpower Commission will meet with industrial managers to outline the program the Commission has developed to meet the manpower problem at a conference of the American Management Association to be held September 29-30 in New York City.

Companies from virtually every industry in the United States will have representatives at the sessions which will be featured by addresses by the members of the War Manpower Commission and by discussions of specific labor supply questions. The Conference has been planned under the direction of L. A. Appley, Vice President of Vick Chemical Company and Vice President in charge of AMA's Personnel Division.

The speakers of the conference, which will be held at the Hotel Pennsylvania, include: Fowler V. Harper, deputy chairman, War Manpower Commission; Major General Lewis B. Hershey, director, Selective Service System; Brigadier General Frank J. McSherry, director of operations, War Manpower Commission; Arthur Flemming, commissioner, United States Civil Service Commission; and John Corson, director, United States Employment Service.

Other speakers will be: Lieutenant Colonel George H. Baker, Chief, Manpower Division, Selective Service System; Edward C. Elliott, Professional and Technical Personnel Division, War Manpower Commission; R. E. Gillmor, Management-Labor Policy Committee, War Manpower Commission; Clinton S. Golden, Assistant to President, United Steelworkers of America; and Anna Rosenberg, Regional Director, Social Security Board.

Hundreds of questions which the Association has received from companies throughout the country will form the basis of discussion at the sessions. The questions relate to such subjects as worker supply, labor allocations, transfers of workers, and military deferment of key workers. The role of the United States Employment Service as a central hiring agency, union problems in the transfer of workers, the drafting of young technical students, and operations of regional manpower commissions are other subjects listed for discussion.

Other sessions of the Conference will be devoted to War Labor Relations problems: "Wage Stabilization," "Keeping Manpower at Work," and "Dealing with the War Labor Board."

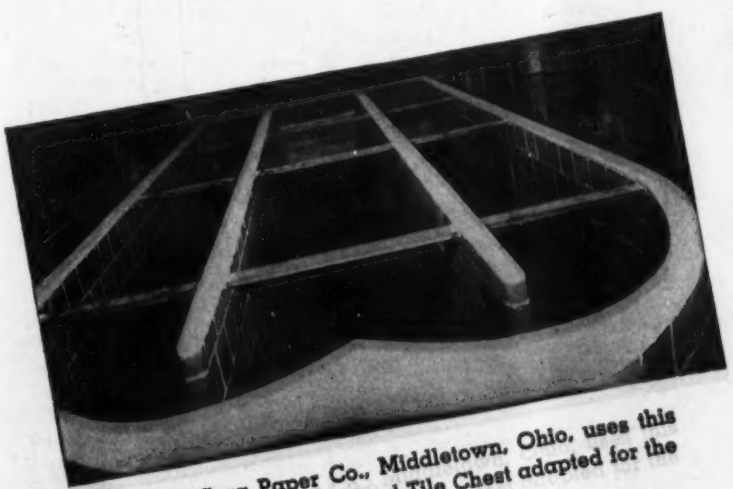
Paper Stock Demand Improves

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., August 31, 1942—Box board mills are receiving more orders, so that kraft items in paper stock for use in manufacturing boards are in good demand.

The paper stock market was generally quiet during August, but after Labor Day, conditions are expected to improve and continue better for the balance of the year.

In bagging, with the supply from India practically cut off, should there be any heavy demand this fall, it would appear as if there would be a rapid recovery in prices. The supply is not too great.



The Sorg Paper Co., Middletown, Ohio, uses this 37-foot Kalamazoo Glazed Tile Chest adapted for the Shartle Bros. "Agi-Flow."

KALAMAZOO TILE CHESTS

Low storage cost, smooth walls inside and out for quick cleaning, and carefully designed adaptation to pump delivery and agitation for stock storage and bleaching — those are the advantages that make Kalamazoo Glazed Tile Chests a good business investment.

Any Kalamazoo Chest can be built to your individual requirements, and delivered promptly. Send for complete information.

Pioneers of Kalamazoo Vitrified Glazed Tile

GLAZED TILE

KALAMAZOO TANK & SILO CO.

KALAMAZOO, MICHIGAN

WOOD

CONSTRUCTION NEWS

Under limitations order L-41 all projects involving expenditures of more than $5,000 must be specifically approved by the War Productions Board. The status of projects reported herewith under the provisions of the order is not known.—EDITOR.

Longview, Wash. — The Pacific Paperboard Company, Columbia way, manufacturer of paper board products of various kinds, container board, pulp board, etc., has approved plans for new two-story addition to mill, about 40 x 80 feet, to be used for expansion in main production department. Erection will be carried out by company forces and is being placed under way. Completion is scheduled early in the fall. At a later date, company proposes to construct another addition, extending along one side of main mill, totaling about 100 feet in length.

Kansas City, Mo.—The Phenix Box and Label Company, 1632 Central avenue, manufacturer of folding paper boxes and containers, has completed plans for new building at 4121 Mill street, to be used for storage and distribution, and will carry out erection with day labor. Work is scheduled to begin at once.

Baltimore, Md.—The Continental Roofing Mills, 1500 South Ponca street, manufacturer of roll roofing, roofing and building papers, etc., an interest of Ruberoid Company, 500 Fifth avenue, New York, N. Y., have awarded general contract to McNamara & Co., Clarkson and McComas streets, Baltimore, for proposed improvements in plant, recently referred to in these columns, including installation of new metal storage tanks and auxiliary facilities. Work will be placed under way at once.

Seattle, Wash.—The Bemis Brother Bag Company, 53-67 Atlantic street, manufacturer of paper bags and containers, etc., has completed plans for new addition to local plant, to be used primarily for storage and distribution. Erection contract has been awarded to Austin Company, Dexter-Horton Building, and work is scheduled to begin at early date. Richard Ellis, last noted building, is architect.

Cleveland, Ohio — The Dobeckum Company, 3301 Monroe street, manufacturer of cellophane containers, bags, etc., has perfected new semi-automatic equipment for placing cellophane bags inside of fiber containers for packaging of vegetable shortening and other food specialties. The equipment rolls back the edge of the cellophane over the top of the container, and permits the filling of the unit with regular loading machines for such purpose. When filled, a cellophane film is heat-sealed over the top. Each unit of the equipment has a capacity for handling about 600 containers an hour. It is proposed to make installations at the plants of various food companies using containers of this type, with the Dobeckum Company maintaining ownership of the equipment.

New York, N. Y.—Charles F. Hubbs & Co., 383-89 Lafayette street, commercial paper products, has arranged for purchase of the four-story and basement building at location noted, which company has occupied for about 30 years for main offices and warehouse service. It has been leased heretofore from the S. Charles Welsh Estate. At a later date, after the conclusion of the war, it is planned to add two additional stories to the building for increased storage and distribution space. A branch warehouse is now maintained at 30 Beekman street, with another similar branch at Hollis, L. I.

Nashua, N. H. — The Nashua Gummed and Coated Paper Company, 44 Franklin street, manufacturer of gummed and other processed paper stocks, is considering rebuilding of one-story structure at mill on Bowers street, recently damaged by fire, with loss reported close to $15,000. The building was used for storage and distributing service.

Escanaba, Mich.—The Escanaba Paper Company, manufacturer of book, newsprint, and other paper stocks, affiliated with the Mead Corporation, Chillicothe, Ohio, is said to be arranging for immediate work on superstructure for proposed new addition to mill at Groos, near Escanaba, recently referred to in these columns.

Kalamazoo, Mich.—The Kalamazoo Stationery Company, writing and other paper stocks, is considering early rebuilding of portion of storage and distributing warehouse, recently destroyed by fire, caused by lightning. An official estimate of loss has not been announced.

Three Rivers, Que. — Canadian International Paper Company, Montreal, Que., manufacturer of newsprint, is arranging for early erection of new one-story addition to branch mill at Three Rivers. It will be used for expansion in core paper department, with installation of core machinery and auxiliary equipment.

New Companies

Chicago, Ill.—The L. L. Paper Products, Inc., 120 North May street, has been incorporated with capital of 150 shares of stock, no par value, to manufacture and deal in paper goods of various kinds. The incorporators include F. B. Metzendorf and L. A. Noumann.

Detroit, Mich.—The Cadillac Bag Company, 409 East Jefferson avenue, has been chartered with capital of $5,000, to manufacture and deal in paper bags and containers. Michael F. Williams, 1900 Woodsboro street, Royal Oak, Detroit, is principal incorporator.

Michigan Alkali Moves

After August 20 the general sales offices of the Michigan Alkali Company will be located in Wyandotte, Mich. The previous location was in the Ford Building, Detroit. All communications intended for the general sales offices should be directed to the new address. The new telephone number is Wyandotte 1700. The new mail address is Post Office Drawer 472, Wyandotte, Mich.

POWER AND LABOR PROBLEMS

(Continued from page 13)

"This decision brings the Canadian regulations into conformity with those of the United States, where newspapers, magazines and periodicals were from the outset exempted from the price ceiling."

Vining Made Publicity Director

Charles Vining, Montreal newsprint executive, who recently visited the United States in order to report to the Government on information distribution there in respect to Canada's war effort, has been appointed chairman of a new body known as the War Information Board. This board will "assist in distribution of Canadian war news and information in Canada as well as in the United States and other countries." Headquarters will be in Ottawa, but offices will be opened in New York, Washington and in such other centres as may be found advisable. Mr. Vining is a native of Winnipeg, and is 45 years old. He is a graduate of the University of Toronto, and is a veteran newspaper and advertising man. For some years he has been president of the Newsprint Association of Canada, with headquarters in Montreal.

Newsprint Administrator To Be Appointed

A despatch from Ottawa announces "on reliable authority," that R. L. Weldon, president of the Bathurst Power and Paper Company, is to be appointed Newsprint Administrator for the Wartime Prices and Trade Board, to succeed Charles Vining, who has been appointed chairman of the Government's new Wartime Information Board.

Urge Cooperation for Salvage

James David Zellerbach, president of the Crown Zellerbach Corporation and Thomas Luke, president of the West Virginia Pulp and Paper Company, are participating in the work of the American Industries Salvage Committee to enlist the full cooperation of individual industrial concerns behind the current scrap salvage program of the War Production Board, according to an announcement by Robert W. Wolcott, Chairman of the Committee.

Serving as liaison between the American Industries Salvage Committee and individual companies in the Paper industry, Mr. Zellerbach and Mr. Luke have written to companies in the industry urging full and complete cooperation with the program of the Industrial Salvage Section of WPB. They have also asked that each company appoint a responsible official to assist in any way possible the local general Salvage Committees that have been established by WPB in 12,000 communities.

Brown Co. to Pay Over Million in Fees

PORTLAND, Me., August 31, 1942 — On file in federal court here last week was Judge John A. Peters' memorandum allowing payments of approximately $1,046,000 to more than two-score individuals, law firms and banks for fees and expenses in reorganizing Brown Company, Berlin (N. H.) pulp and paper manufacturers.

Ropes, Gray, Best, Coolidge & Rugg of Boston, as counsel for the reorganization managers and a bondholders' company, received the largest fee of $160,000 and $6,008 for expenses.

Every Paper Production Man should have

THIS NEW MOYNO PUMP BOOK!

Get Yours—and Read How to Solve Your TOUGH Pumping Problems!

IF YOU'RE looking for a new, *different* type of pump that can do the job better and faster—with less maintenance and fewer pumping-trouble delays—send for this free book *now!*

It's a *brand new* 8-page book, packed with practical information on the R & M Moyno Pump. Facts that show how its ability to handle stock, size and coating can revolutionize pumping operations in *your* plant. It tells how the Moyno compares in *principle* with other types of pumps. How it is helping paper and other vital industries to produce more—and improve product quality at the same time. How the Moyno has proved—feature by feature—to be the greatest pumping improvement in decades!

The entire book was written by R & M Moyno engineers who have spent many years solving *tough* paper pumping problems. If you don't need it for immediate reference, you'll want it later. It's yours free—mail the coupon today!

ONLY 1 MOVING PART!

Here's the patented principle of the R & M Moyno Pump's amazing performance. A single-threaded helical rotor revolves in a double-threaded helical stator, providing pumping action like that of a piston moving through a cylinder of infinite length.

Moyno pumps are manufactured under R. Moineau's patents

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Please send me the new 8-page book on the R & M Moyno Pump.

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PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger
EDITOR

Vol. 115 September 3, 1942 No. 10

COMING EVENTS IN PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Fall Meeting, Statler Hotel, Boston, Mass., September 29-October 1.

CONCENTRATION OF INDUSTRY

New records in the production of essential war goods and of many agricultural products will be established this year. New low production levels will be the lot of many industries not directly contributing to the war effort. A brief survey of the current trend in production indicates that concentration of all major industries, including paper and pulp, are impending. In commenting on the rapid conversion of production to speed up the war effort, the monthly *Business Bulletin* for August, published by La Salle Extension University, Chicago, Ill., points out that, "War requirements now take half of the industrial output of the country. The rate of business activity continues to move steadily upward, and industrial production last month was at a new peak. Current reports indicate a further advance this month. No signs of the usual summer slackening have yet appeared in the general average, although many industries producing civilian goods have been compelled to curtail production. Factory output will increase as long as government spending for war purposes continues large and continues to expand each month. . . . War materials now constitute about one-half of total factory output, and the percentage will undoubtedly go much higher during the next few months. In the durable-goods industries, 70% of total output is now war supplies and equipment. A year ago, output of civilian goods was far ahead of production of war materials for, then, less than 20% of what the factories turned out was for military purposes. This drastic shift in the industrial system has already affected nearly every business, and the effects will become even more striking as the war program expands. People will be affected both as consumers and as workers."

Declaring that the La Salle index of business activity is now 40% above the average level during the last three years, and more than 10% higher than it was a year ago, the *Business Bulletin* goes on to say that, "Higher levels of industrial activity are forecast even though shortages of materials and of labor, as well as of available plant capacity, may tend to slow down the rate of advance. Much has already been done to relieve the shortages in many essential materials. . . . Output in several important lines may increase even more rapidly than it has during the last year. New materials will also be available for war purposes as a result of the further drastic cuts in the manufacture of civilian goods. In several of these groups output is now much below last year. A few of the industries which report decreases are paper, printing and publishing, leather products, petroleum products, and shoes. Civilian production in other industries, such as lumber products and metal products, is much reduced, although these industries are operating close to capacity on war orders. Output has increased most strikingly in recent months in the machinery, aircraft, and shipbuilding industries."

Commenting on the rise in new orders the *Bulletin* states in part that, "Further indications as to the future rate of industrial production are given by the number of new orders received by manufacturers. These continue to make spectacular gains. In the latest month for which figures are available, they were 48% higher than a year ago and three times the number received in January, 1939. Orders for durable goods were 80% higher, and five times those received in January, 1939. In the non-durable goods field where orders were somewhat lower than the preceding month, they were substantially higher than last year and about one and one-half times the number received three years ago. . . . Government spending is steadily mounting to record figures. Last month it was considerably over $4,000,000,000, or an average rate of more than $158,000,000 each day. Daily expenditures are almost as great as were the expenditures for the entire month of July, 1940. These large amounts indicate that future demand for factory production will continue to be unusually large."

In reference to labor shortage, the *Bulletin* states: "Shortages of qualified workers have been evident for some time in those centers where major war industries are located. They are now becoming more widespread and, according to a recent survey by the National Conference Board, employment has for the first time since 1929 become greater than the number of persons normally employed. Further expansion in war production will be possible only as those who are not normally employed in industry begin working in factories as employees are shifted from the production of civilian goods. These shifts have already been taking place and will be speeded up during the next few months."

Current reports indicate that the War Production Board has directed its branches to make a survey in their respective fields with the objective of adopting concentration programs at the earliest practicable date. Although the paper and pulp industry is, of course, not rated as an important consumer of essential materials, it is likely to be affected and included in the impending concentration plan, with other industries of similar status, because demand for its products may decline to such a low point that the War Production Board may consider it uneconomical to permit all mills to operate as they may individually desire. In the Pacific Northwest where much pulpwood is produced, labor shortage is likely to become acute in the future, as manpower is shifted from the woods to the shipyards and from pulpwood to lumber which is rated more essential for the war effort. Paper and many kinds of paper products are, of course, essential, and will continue to be manufactured in sufficient volume to meet reasonable requirements, but the prospect as indicated in the industrial trend today is that paper and all other non-durable goods, will be in the future produced under a new plan and under the direction of the War Production Board.

Would Speed Up Abitibi Case

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., August 31, 1942—Another round in the 10-year-old litigation relative to Abitibi Power and Paper Company was fought before Mr. Justice Fisher at Osgoode Hall this week.

R. W. S. Johnston, counsel for Montreal Trust Company, trustees for Abitibi, asked the court for directions under which the company would expedite its appeal to the judicial committee of the privy council from the judgment of the Ontario appellate court. This upheld a judgment of Mr. Justice Middleton authorizing the sale of the company's assets.

H. C. Walker and James T. Gow, representing independent defendants, appeared in the same interest as Mr. Johnston. Gordon McMillen and N. T. Berry opposed the motion.

Mr. Johnston contended that there had been undue delay in completing the record notwithstanding that the appellate court had been given an understanding by the appellants that they would hurry. The appellants had also caused delay in insisting on submitting the record to the attorney-general and others who were not parties in the action, he said. Neither would they consent to send the record by air mail, Mr. Johnston contended.

Mr. McMillan replied that there had not been any unreasonable delay. The record would exceed both in weight and bulk the limit set by the air lines, he held. Further, he questioned the jurisdiction of Mr. Justice Fisher to make the order asked as the appellate court had dealt with the case and it was no longer pending there.

Mr. Justice Fisher could not see that there had been deliberate intention to ignore the undertaking as to expedition. He questioned if a further four-months' delay would be injurious. Mr. Johnston said that it was desirous to bring on the sale as soon as possible. Judgment was reserved.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1942		Corresponding Weeks—1941	
July 18	81.5	July 19	100.7
July 25	80.2	July 26	101.9
August 1	79.8	August 2	100.5
August 8	81.6	August 9	99.7
August 15	79.8	August 16	99.0
August 22 (Prelim.)	*80.5*	August 23	102.8

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1941	85.6	89.7	92.2	96.0	98.7	99.3	94.2
1942	104.5	103.9	102.9	100.3	95.4	87.3	*75.5*

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1941	101.0	99.7	105.2	106.2	100.4	97.4
1942	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1935	1936	1937	1938	1939	1940	1941	1942
Year to Date..	68.4	77.9	87.3	68.5	78.7	86.9	94.2	*93.9*
Year Average.	69.9	80.4	79.8	71.5	83.4	85.6	97.4	...

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS †

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	*68*	..	..	..	..	..	..

Week ending July 18, 1942—71
Week ending July 25, 1942—74
Week ending Aug. 1, 1942—76
Week ending Aug. 8, 1942—75
Week ending Aug. 15, 1942—73
Week ending Aug. 22, 1942—*74*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

Swedish Pulp Exports Slightly Higher

WASHINGTON, D. C., September 2, 1942—Total values of pulp and paper exported from Sweden during April remained approximately the same as those exported during April of the preceding year, reports reaching the Department of Commerce state.

Export statistics show the values to stand at 33,700,000 crowns during April 1942 and at 33,100,000 crowns during April 1941.

Pulp and paper exports during the period January-April 1942 fell off 8,000,000 crowns in value, however, when compared with exports during the similar period of 1941. The values follow: April 1941, 96,800,000 crowns; April 1942, 88,800,000 crowns.

Export losses in pulp and paper are consistent with, but not so great as, general losses in Swedish exports.

Import values during April 1942 amounted to 1,900,000 crowns, compared with 2,400,000 crowns during April 1941. Import values during the four-month period January-April 1942 came to 5,500,000 crowns, representing a loss of 3,500,000 crowns from the similar period during 1941, when imports came to 9,000,000 crowns.

C. L. Sheldon to be Acting Chief

WASHINGTON, D. C., September 2, 1942—Charles L. Sheldon has been named acting chief of the WPB Containers Branch. Mr. Sheldon came to the War Production Board several months ago as a consultant, and for the last four months has been Deputy Chief of the Branch. He is a purchasing agent for the Hood Rubber Company, Watertown, Mass.

Mr. Sheldon replaces Douglas Kirk, who resigned recently to return to the Quaker Oats Company, Chicago, Ill.

Announcing

A NEW WET STRENGTH RESIN FOR BEATER USE

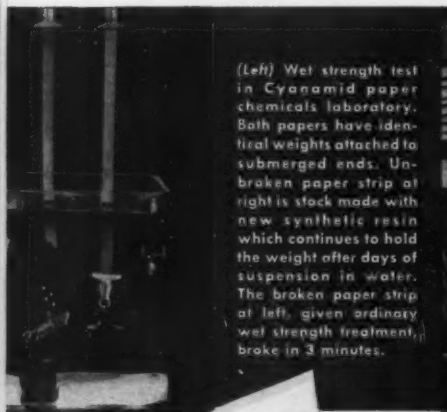
Paper manufacturers long have hoped for the development of a product and process that would impart wet strength to paper and, at the same time, have the practical advantage of being effective when incorporated in the paper stock *prior* to the formation of the sheet. It is with pleasure that American Cyanamid announces the development of such a product and process.

This new product needs only to be dissolved in water, and with the addition of a common and inexpensive chemical can then be added to the stock at the beater or elsewhere. The rest of the paper making operation can proceed as usual. As will be readily appreciated, this simplified method eliminates the bother of surface applications. The paper will be found to retain a substantial percentage of its dry strength even after prolonged soaking in water.

Certain valuable and unexpected properties, in addition to those for which the new synthetic resin was originally developed, are now reported by the Cyanamid technical staff. These features are included in the following summary, and apply when the resin is properly used as in the manner described above . . .

1. Folding endurance of the *dry* paper is considerably higher than without the resin treatment.
2. Bursting and tensile strengths of the *dry* paper are appreciably higher.
3. Resistance to water absorption of rosin sized papers is improved.
4. Absorbency of unsized paper is not noticeably affected.
5. These properties of paper are retained after prolonged storage even under adverse conditions of temperature and humidity.

If you are one of the many manufacturers who have been waiting for such a product, write us for more complete information or talk it over with your Cyanamid representative. Cyanamid technical service men are available for mill demonstrations.



(Left) Wet strength test in Cyanamid paper chemicals laboratory. Both papers have identical weights attached to submerged ends. Unbroken paper strip at right is stock made with new synthetic resin which continues to hold the weight after days of suspension in water. The broken paper strip at left, given ordinary wet strength treatment, broke in 3 minutes.

(Left) The new Cyanamid synthetic resin gives to blueprint paper the wet strength needed in continuous roll blueprinting to prevent tearing under stress after submersion.

(Right) The new Cyanamid synthetic resins for paper making facilitate manufacture of wet strength cartons and the production of a better board.

WAX SIZES • COATING MATERIALS
ROSIN SIZES • SYNTHETIC RESINS
CASEIN • ALUM • CORN STARCH
TAPIOCA FLOUR • SULPHONATED
OILS • FILLERS • DEFOAMERS
AEROSOL* WETTING AGENTS and
OTHER PAPER CHEMICALS

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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Surface Wettability of Paper (Angle-of-Contact Method)

TAPPI Suggested Method T 458 sm-42

The object of this method is the quantitative determination of the resistance of paper surfaces to wetting. It is useful for the determination of writing and ruling qualities of papers as well as for other problems related to the resistance which the surface of paper offers to water and aqueous vehicles. This method deals with the behavior of a drop of water, or aqueous solution, when applied directly to the surface. The procedure recommended is that of Lafontaine *(3)* and involves the measurement of the angle of contact. Additional information is included on a method proposed by Codwise *(1, 2)* which depends upon the spreading of the drop of water.

It is a well-known fact that the advancing angle of contact between a liquid and a smooth solid surface is a measure of the wettability of the latter by the former and the following method has been evolved around this fact.

Apparatus

The preferred projection apparatus, a side elevation of which is shown in Fig. 1, consists of:

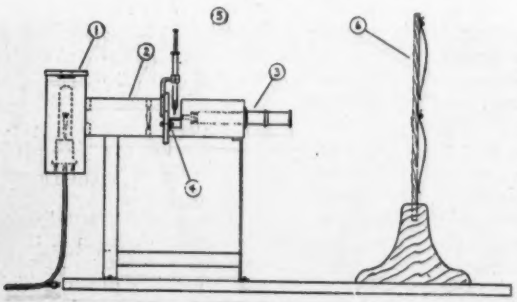

FIG. 1.

1. A ventilated lamp house containing a 250-watt projection lamp.
2. A tube containing a lens to concentrate the beam of light.
3. A horizontal stage to hold the sample under test, the stage to be adjustable vertically.
4. A microscope draw tube fitted with a 25-mm. objective and a 5X ocular mounted horizontally beside the stage.
5. A syringe, such as a 1-ml. hypodermic, equipped with a No. 27 stainless steel needle. (This gives 150-200 drops per ml.)
6. A frosted glass screen with clamps to hold a sheet of paper.
7. A water cell inserted between the lens which concentrates the light rays, and the stage on which the sample is placed.

If the above equipment is not available, a suitable microscope is used for projecting the image of the drop on the glass screen. Bausch and Lomb Optical Co. and other manufacturers have small projection microscopes with a magnification of about 30X which are suitable for the purpose. A small buret or pipet adjusted to deliver 1/150 to 1/200 ml. may be substituted for the hypodermic syringe if desired.

Solutions

1. For measuring the writing qualities of paper, use the standard writing ink specified in TAPPI Standard T 431 m for Ink Absorption of Blotting Paper.
2. For determining the ruling qualities of paper, use a solution of 0.01 gram of a water-soluble blue dye dissolved in 100 ml. of distilled water.

Test Specimens

The test specimens shall consist of strips ½ inch wide and 4 inches long cut from the paper sample in such a way as to be thoroughly representative of it. Both sides of each strip shall be tested. The actual areas tested shall not contain watermarks or visible blemishes or defects and shall not be touched with the fingers or contaminated in any other way.

Procedure

Condition the test specimens according to TAPPI Standard T 402 m and conduct the tests under the atmospheric conditions therein specified.

Place a test strip on a slide on the stage and hold it in close contact with it by means of small weights placed close enough on each side of the needle to prevent distortion of the paper when it is wetted by the drop of ink or water.

Set the tip of the hypodermic needle ⅛ inch from

REPRINT NOTE: Reprints of TAPPI Suggested Method T 458 sm-42 can be obtained from the Technical Association of the Pulp and Paper Industry, 122 East 42nd St., New York, N. Y., at 25 cents each.

the surface of the strip and deposit a drop 1/150 to 1/200 ml. in size on the paper. Project the image of the drop, enlarged 25 to 30 times, on the glass screen, at the back of which is clamped a sheet of transparent onionskin paper. Draw a horizontal line on the transparent paper coinciding with the image of the base of the drop and as soon as the specified time of contact of the drop with the paper has elapsed, quickly draw two tangents to the curve at the two points of contact with the base line. The interior angle between the base line and each tangent is designated as the angle of contact. Measure the angles with a protractor.

For initial wettability, used as a measure of ruling quality, make the measurement of the angle after the drop has been in contact with the paper for 5 seconds. For rate of change in wettability, used as a measure for writing quality, make two measurements, one after 5 seconds and the other after 60 seconds have elapsed.

Make measurements for 5 drops on each side of the paper. Between successive tests move the transparent paper to a new position to avoid confusion of lines.

Report

The average and the maximum and minimum test results for each side of the paper shall be separately reported as *Initial wettability*, or the average *rate of wettability change* shall be calculated as given below and reported for each side. If possible to identify the two sides, the results shall be designated as wire side and felt side; otherwise the sides may be arbitrarily designated as, for example, A and B. The report shall state the liquid used for the test,—for example: Rate of Wettability Change to Ink.

(a) Initial Wettability shall be reported as the average angle of contact after 5 seconds exposure, to the nearest degree.

(b) Rate of Wettability Change shall be calculated as follows:

Let R = rate of wettability change in degrees per second;
A = av. angle of contact after 5 seconds;
and a = av. angle of contact after 60 seconds.

Then $$R = \frac{A - a}{55}.$$

Report the rate to two significant figures.

Precision

While variations between individual drops on one side of a single strip of paper may be as great as 5 degrees, the average of 10 angles of contact will usually not vary by more than 2 degrees between two strips cut from the same sheet of paper, when tested on the same side of the sheet, provided the variations in finish between the two strips cut from different parts of the sheet are not too pronounced.

Interpretation of Results

In considering the results of the angle-of-contact test, one must bear in mind the following factors which all affect the results in different degrees: the wetting power of the solution used, the wettability of the sizing agent used in sizing the paper, and the surface texture or finish of the paper.

For instance, the standard ink will give smaller angles of contact than water, indicating that it wets the paper more readily than water. Papers surface-sized with starch will generally show smaller angles than papers of about the same finish tub-sized with glue. A machine-finished paper with a grainy surface would have a greater angle of contact than a plated or calendered paper of equal sizing. It is known that, in practice, ruling results will depend on both the surface wettability and finish of the paper. Thus, the angle of contact should give a good idea of what is to be expected. It has been found that excellent ruling will prevail when the average angle of contact with water lies between 100° and 90°; when the angle of contact is greater than 110°, breaks are likely to occur in the ruled lines; when the angle is smaller than 90°, the ruling ink is likely to feather.

In determining the writing qualities of paper by means of the angle of contact, one must take into account that medium-sized papers will at times show feathering only after the ink has partly penetrated in the paper. The tendency of a writing paper to feather will be indicated by the decrease in the angle of contact between the 5-second and 60-second measurements. In hard-sized papers, the angle of contact will not change perceptibly between the 5- and 60-second readings. If the initial wettability is less than 90, it is quite likely the paper will feather as soon as it is written upon.

As the range in contact angle for specific conditions is small, refined technique is required in performing the test. This is indicated by the above examples as well as by theoretical considerations.

Additional Information

In cases where the above equipment is not available there is another method which will be found useful in the investigation of surface wettability. This is the spreading test around a larger drop of water applied to the paper surface. It depends upon observation of the behavior of a drop of distilled water when it is placed upon a sized surface. A drop equal to 0.2 ml. is applied from a pipet by holding the tip just above the surface in such a way that the tip remains in the drop as it is being formed. Upon coming into contact with the paper it tends to form a spherical shape and when the surface is sized, the surface of contact between the water and the drop assumes a clear, bright appearance which gradually darkens as the water penetrates the surface.

When the drop of water is first placed upon a sized surface the appearance of the paper adjacent to it is unchanged. However, as the wetting of the surface proceeds there is observed a feathering around the drop, and a feather edge commences to form. The expired time from the application of the drop to the surface until the water commences to creep out from around the drop is recorded as the numerical result of this test. When the test is made at standard temperature and humidity, the results are closely reproducible, and it gives a wide range of results depending upon the surface under test. An unsized surface will feather immediately; a poorly sized writing paper which will feather with pen and ink may give only a 10-minute test; a satisfactory writing surface may give 10 hours; and a hard-sized board surface may give over 24 hours. When the expired time is of long duration, the drop of water should be covered with a watch glass.

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Monoethanolamine Extraction of Wood for the Determination of Cellulose

By Philip Bloom[1], E. C. Jahn[2] and L. E. Wise[3]

Abstract

Factors influencing the delignification of aspen and Sitka spruce by monoethanolamine, such as time, temperature, particle size, and liquor ratio, were studied. Alpha-cellulose digested in monoethanolamine suffered practically no loss, but aspen holocellulose lost about 18% leaving a residual cellulose equivalent in yield to that obtained directly from the wood by the Cross and Bevan method.

A suitable method for determining cellulose in wood is to digest 60-80 mesh sawdust in monoethanolamine for 2 hours at 168-170 deg. C., followed by chlorine water-sodium sulphite treatments (2 for hardwoods and 3 for softwoods). Celluloses obtained by the usual Cross and Bevan method and the monoethanolamine procedure are broadly similar in their chemical composition.

There is a marked difference in the behavior of hardwoods and softwoods to monoethanolamine; the former delignify easily and the latter with difficulty.

Cellulose in wood and other lignified plant tissues is not a chemical entity—i.e., it is not a "pure" or "true" cellulose such as cotton cellulose. Wood cellulose varies in purity and composition depending upon the method of isolation and the species from which it is derived. The largest part of all wood celluloses is apparently similar to and chemically identical with cotton cellulose. However, closely associated with this true cellulose are other polysaccharides, which Hawley and Norman *(5)* designate as cellulosans. These are extremely difficult to remove from the true cellulose and Norman (6) has shown that, from the earliest stages of growth, these cellulosans form an integral part of the wood cellulose structure in the cell wall.

The isolation of the true cellulose from wood cannot be achieved by known methods without some alteration or degradation. All known methods for determining wood cellulose are empirical and yield a cellulose residue which contains amounts of the cellulosans which vary with the procedure. Of all the methods studied, modified Cross and Bevan procedures are most universally used and, despite obvious limitations, the chlorination methods give consistent results under careful manipulation.

Many improvements have been made on the chlorination method, and the modified procedures of Ritter and Mitchell *(11)* and of Norman and Jenkins *(7)* are perhaps the most serviceable and precise. However, the search for a more ideal method continues; one which would require less time and fewer manipulations, decrease the affect of the personal equation and give equal or greater precision with little or no alteration or degradation of the cellulose. Various organic compounds which react with and have a solvent action upon lignin have been investigated. Among these is monoethanolamine, which on the basis of preliminary work, showed promise of being a good delignifying agent.

In January, 1939, Wise, Peterson, and Harlow *(15)* reported that anhydrous monoethanolamine nearly completely delignified aspen and beech sawdust, when the wood was treated at or near the boiling point of the chemical for about 5 hours. Subsequent treatment with chlorine water and sodium sulphite gave a white product in a yield nearly identical to that obtained by the Cross and Bevan chlorination procedure. They said that, "Although the analytical procedure by the ethanolamine method . . . should be checked with a large number of woods, it seems probable that it will yield a residue comparable to Cross and Bevan cellulose. If so, it has much to recommend it over the procedure for isolating the latter. No preliminary extractions are required, and the manipulations are much simpler."

It is the purpose of this study under the auspices of the Fibrous Materials Testing Committee of the TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY to investigate these assumptions, to make a thorough study of the variables involved in the method and to compare the cellulose obtained with that isolated by other methods. A progress report was presented at the 1941 Annual Meeting of TAPPI *(1)*.

The initial work of Wise, Peterson, and Harlow led to the issue of patents *(8, 9)* relating to the delignification of wood by alkylolamines and alkylamines. The analytical method also was applied to the determination of cellulose in the woody portions of the rhizomes of brake fern *(4)* with a result closely comparable to that obtained by the chlorination procedure.

Reid, Nelson, and Aronovsky *(10)* have reported the results of their study on the use of monoethanolamine for determining cellulose in agricultural wastes. These workers found the reagent satisfactory for fibrous farm wastes, provided the product was subsequently given a mild bleach with sodium hypochlorite and then digested with sodium sulphite. Spruce lignin was found to be more resistant to removal and required stronger bleach treatment. In the case of sprucewood, they recommend that the material be refluxed with monoethanolamine for 3 hours, allowed to cool for one-half hour, and, after washing, that it be given 2 successive alternate treatments with acidified sodium hypochlorite and hot sodium sulphite of specified concentrations, amounts and lengths of time.

Reid, *et al.* compared the monoethanolamine celluloses with celluloses isolated by other methods. In the case of fibrous farm wastes the monoethanolamine cellulose compared favorably in yield and chemical composition with Cross and Bevan and Norman and Jenkins celluloses. The monoethanolamine method

Report on TAPPI Project of Fibrous Raw Materials Testing Committee at the New York State College of Forestry, Syracuse, N. Y. Financially aided by a TAPPI Research Grant from the Research Promotion Committee.

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equaled the Cross and Bevan in precision and has an advantage over this and other methods in the saving of time and effort. However, their results indicate that the application of the monoethanolamine method to coniferous woods requires further study.

Fisher and Bower *(3)*, in a recent study of the action of the ethanolamines, morpholine, and phenylmorpholine on cornstalks, indicate that the amount of lignin extracted depends upon the basic strength of the nitrogen bases, but they point out that this does not preclude the possibility that the anhydrous bases may remove lignin by organic solvent action.

Wood Studied

For an intensive study of the variable factors involved, and the determination of optimum conditions for digestion with monoethanolamine, two species were selected, largetooth aspen (*Populus grandidentata* Michaux) and Sitka spruce (*Picea sitchensis* Carr.). The wood was ground in a Wiley mill and screened to 60-80 mesh. Certain other mesh sizes were screened out for the study of the effect of particle size on delignification by monoethanolamine. The screened material was then extracted in Soxhlet extractors for 6 hours with alcohol-benzene (2:1), in order to avoid any possible complication from extraneous materials. The wood was air dried and bottled.

The original wood samples were analyzed according to standard procedure *(1)* (Table I).

TABLE I.—ANALYSIS OF ASPEN AND SITKA SPRUCE

	Aspen		Sitka Spruce	
Analysis moisture-free	Basis original wood	Basis alcohol-benzene extracted wood	Basis original wood	Basis alcohol-benzene extracted wood
Alcohol-benzene solubility.	2.6	...	2.3	...
Ether solubility	0.86	...	0.31	...
Hot water solubility.....	2.4	...	2.8	...
Pentosans	19.7	20.2	8.1	8.3
Lignin	17.7	18.2	27.4	28.0
Cellulose[1] (Cross & Bevan)	66.3	68.1	63.3	64.8

[1] 4 Chlorination treatments for aspen, 8 for Sitka spruce. Residual lignin in aspen cellulose 0.18%, in Sitka spruce cellulose, 0.2%.

For the study of delignification by sodium chlorite, beech (*Fagus grandifolia* Ehrh.) as well as the above two species were used. The wood samples were prepared in the same way as described above. The investigation of the effects of sodium chlorite and chlorine water post-treatments on monoethanolamine digested wood carried out on largetooth aspen, Sitka spruce, beech, fire cherry *(Prunus pennsylvanica* L.), white oak *(Quercus alba* var. Max.), western larch (*Larix occidentalis* Nuttal), shortleaf pine (*Pinus echinata* Miller), Douglas fir (*Pseudotsuga taxifolia* Britt.) and redwood (*Sequoia sempervirens* Lambert).

For the comparative study of monoethanolamine cellulose with Cross and Bevan celluloses obtained by chlorine gas and by chlorine water, largetooth aspen and Sitka spruce were used.

Apparatus

All monoethanolamine digestions were carried out in 250-cc. Erlenmeyer flasks covered with small watch glasses. These flasks were immersed in an oil bath and held by clamps. The oil bath was specially built for this study and is a heavy metal bath 14 inches by 16 inches by 15 inches deep, electrically heated by a 2000-watt heater on a 3-heat switch, and a 500-watt heater controlled by a thermoregulator. Extra heavy cylinder oil is used and is stirred by an electrically-driven stirrer. Eight determinations can be made at one time.

Reagents

Monoethanolamine as obtained commercially varies in degree of purity. For this work the fraction boiling at 168-170 deg. C. was used. A commercial product, water-clear and all distilling at 168-170 deg. C. was obtained and used for most of the work. The other anhydrous amines used, phenylethanolamine, diethylenetriamine, diethanolamine, triethanolamine, and diethylaminoethanol were all technical grade.

Procedures

Digestion in Monoethanolamine

The procedure was varied to determine the effect of variable factors. One to 2 gram samples of moisture-free alcohol-benzene extracted wood were used. An ethanolamine to wood ratio of 50 parts by weight of reagent to 1 part of sample was used. All samples were digested at 168-170 deg. C., expect a series to determine the effect of temperature. At the end of the digestion period the samples were removed from the bath, allowed to stand 3 minutes, diluted with a volume of water equal to that of the monoethanolamine, and filtered through a medium porosity fritted glass crucible. The residue was then thoroughly washed with a large volume of cold water and oven-dried. The yield and lignin content were determined. The amount of water used for diluting the digested mixture is immaterial, since it was found that the addition of large volumes of water caused no difference in the results and did not precipitate any material from the monoethanolamine solution. Only sufficient water to facilitate filtration is needed.

Delignification by Modified Cross and Bevan Method

Two-gram samples of moisture-free alcohol-benzene extracted 60-80 mesh wood were used. The chlorinations were made by bubbling gas through a fritted glass crucible containing the moistened sample. The gas was allowed to enter at a rate of 120 bubbles per minute for 3 minutes. The chlorinated sample was washed successively without removing from the crucible with 50 cc. of cold water, 50 cc. of 2-3% sulphur dioxide solution, 50 cc. of cold water, 50 cc. of 2% sodium sulphite solution, and finally with cold water. Over the washed material was poured a quantity of hot 2% sodium sulphite solution and the crucible and contents placed in a beaker containing sufficient hot 2% sodium sulphite solution to surround the crucible, and gently boiled for 30 minutes. The material was then washed thoroughly with cold water. The entire procedure was repeated the necessary or desired number of times.

Delignified by Chlorine Water

Two-gram samples of air-dry, alcohol-benzene-extracted wood were subjected to chlorine water treatment as follows. Fresh chlorine water was prepared by bubbling the gas into cold water to make a solution containing 7 to 10 grams of chlorine per liter. Sufficient chlorine water was added to the wood samples so that there was 0.2 gram of available chlorine per gram of original wood. The chlorine water was allowed to act on the wood for 5 minutes at room temperature and then the mixture was filtered on a tared fritted glass crucible. From this point the wash-

ing and digesting of the sample were identical to the procedures described under the modified Cross and Bevan method above.

Delignification with Sodium Chlorite

To approximately 2 grams of air-dry, alcohol-benzene-extracted wood in a 250-cc. beaker was added an amount of hot 2% sodium chlorite solution equal to 0.2 gram $NaClO_2$ per gram of original dry wood. The mixture was immediately acidified with 0.5 cc. of 10% HCl and boiled for 30 minutes. The sample was then filtered on a tared fritted glass crucible and washed thoroughly with cold water. The above treatment was repeated the desired number of times on the moist residue and then the sample was air-dried.

Analytical Methods

The two species used for most of this work were analyzed (*see* Table I) according to the methods of the U. S. Forest Products Laboratory *(2)*.

The isolated celluloses were analyzed for pentosans and residual lignin by the methods of the U. S. Forest Products Laboratory. Alpha-cellulose and cuprammonium viscosity values were obtained by TAPPI Standard Methods *(14)*.

Factors Influencing Delignification by Monoethanolamine Digestion

Time of Digestion

Lignin is extracted quite rapidly from aspen and is nearly completely removed at 6.5 hours. The delignification of Sitka spruce is slow, however, for after 24 hours treatment there is still 3.8% lignin in the product (Table II and Fig. 1). Continued digestion decreases the yield in greater amount than the percentage lignin removed, showing that a portion of the carbohydrate material is lost. The time selected for further studies was 5 hours, since aspen was nearly delignified at this point and it is desirable for comparative purposes to hold to a constant time period.

Temperature of Digestion

Temperature has a marked effect on the results and only temperatures at or close to the boiling point are effective (Table III and Fig. 2). The temperature

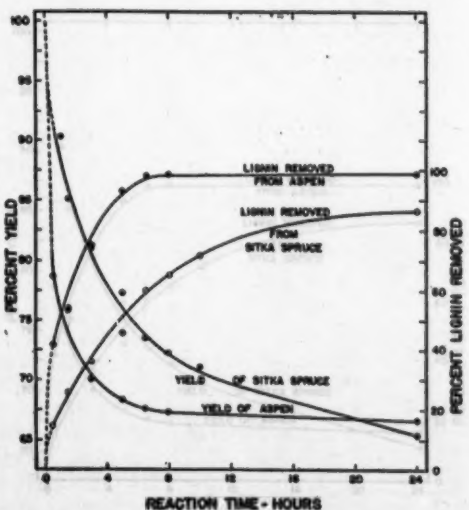

Fig. 1
Rate of Delignification in Monoethanolamine.

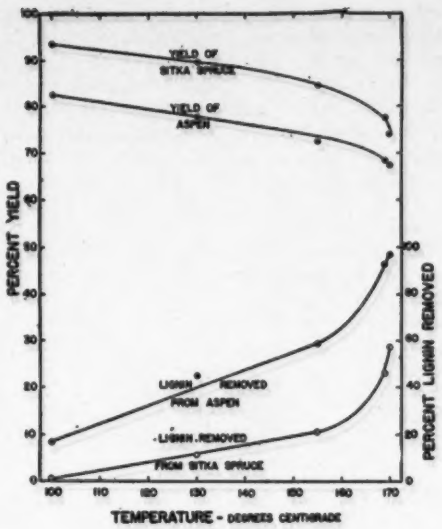

Fig. 2
Effect of Temperature on Delignification by Monoethanolamine.

selected for the oil bath, therefore, was that of the boiling range of the monoethanolamine, namely 168-170 deg. C.

Particle Size

The yield of cellulose by digesting aspen in monoethanolamine varies directly with the particle size of the wood, but the percent lignin removed does not (Table IV and Fig. 3). The 60-80 mesh material lost the maximum lignin, although the amount removed from the 35-60 mesh was about the same. The amount removed from the finer fractions and the coarsest fraction is less. However, the yield steadily dropped with decreasing particle size. The finer the material the more readily is the carbohydrate portion subject to attack. It is important, therefore, to select a particle size just fine enough to be readily delignified with least possible loss of carbohydrate. The 60-80 mesh fraction appears to be best.

Ratio of Chemical to Wood

Aspen sawdust, 60-80 mesh (1 gram samples) was

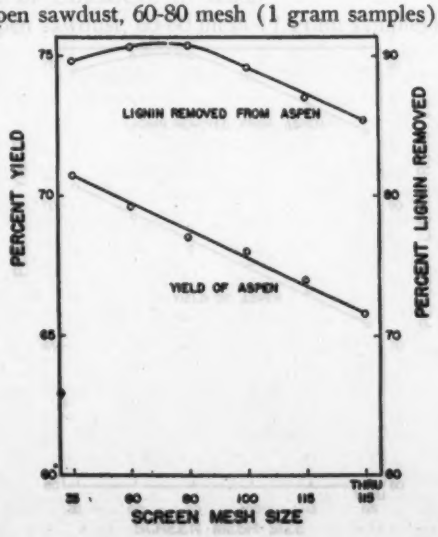

Fig. 3
Effect of Particle Size on Delignification by Monoethanolamine.

digested with monoethanolamine in weight ratios of 1 to 12.5, 25.0, 37.5, 50.0, and 62.5. The yields and the residual lignin were the same in all cases, being 68.1-68.4% and 1.3-1.4%, respectively. The amount of monoethanolamine used, therefore, is immaterial, except insofar as ease of handling is concerned. A liquor:solid ratio of 37.5:1 or 50:1 is convenient.

Moisture in the Sample

The yield and lignin content of the residues after monoethanolamine digestion (5 hours, 168-170 deg. C., 50:1 liquor ratio) are not affected by the presence of water in the original sample for the range of moisture contents studied (1.23, 4.62, 7.76, 13.37, and 28.20%). The values were the same in all cases—68.3% yield and 1.3% residual lignin. As the water content of the sample is increased the immediate effect is a lowering of the boiling point of the monoethanolamine, which gradually rises again as the water is lost.

Effect of Monoethanolamine on Cellulose

In order to ascertain the effect of monothanolamine on cellulose two samples of high-grade alpha-cellulose (99% alpha, 1.8% pentosan) and two samples of aspen holocellulose were digested with monoethanolamine for 5 hours at 168-170 deg. C., and a ratio of 50:1. The yields on the alpha-cellulose were 99.5% and on the holocellulose 81.9%. Apparently monoethanolamine has practically no effect on cellulose under the conditions used, but causes a large loss from the holocellulose, presumably of hemicelluloses. These hemicelluloses lost are closely similar in quantity to those removed by the Cross and Bevan procedure on wood. Since the yield of aspen holocellulose was 80.7%, the residual cellulose, on the basis of the original wood, is 66.1%, which checks closely with the Cross and Bevan value of 66.3%.

Delignification by Monoethanolamine Plus Other Chemicals and by Other Anhydrous Amines

Effect of Other Chemicals

Since Sitka spruce resists delignification by pure monoethanolamine, it seemed possible that certain chemicals in combination with monoethanolamine would facilitate the delignification. Fourteen different chemicals were tried including several different hydroxyamines. Most of them had little or no effect, but some such as ammonia and phenol, retarded the reaction. Only two of the chemicals tried increased the delignification to any marked extent. These were anhydrous sodium hydroxide and glucose (Table V).

TABLE II.—RATE OF DELIGNIFICATION BY MONOETHANOLAMINE [1]

	Aspen			Sitka Spruce		
Time, hours	Yield,[2] %	Lignin in Product, %	Lignin Removed,[3] % of Original Lignin	Yield,[2] %	Lignin in Product, %	Lignin Removed,[3] % of Original Lignin
0.5	78.6	10.8	41.7	90.3	23.9	14.6
1.5	75.8	8.4	53.9	85.1	20.8	25.7
3.0	70.0	4.7	74.2	81.0	18.0	35.7
5.0	68.4	1.3	92.9	77.4	15.3	45.4
6.5	67.6	0.34	98.1	73.5	11.3	59.7
8.0	67.3	0.30	98.3	72.2	9.8	65.0
10.0	...	...	...	71.1	8.0	71.4
24.0	66.6	0.22	98.8	65.4	3.8	86.4

[1] Moisture-freed alcohol-benzene extracted wood digested with anhydrous monoethanolamine at a ratio of 1:50 parts at 168-170 deg. C.
[2] Based on percentage of moisture-free alcohol-benzene extracted original wood.
[3] Based on percentage of original lignin in moisture-free alcohol-benzene extracted wood.

TABLE III.—EFFECT OF TEMPERATURE ON DELIGNIFICATION BY MONOETHANOLAMINE [1]

	Aspen			Sitka Spruce		
Temperature, deg. C.	Yield,[2] %	Lignin in Product %	Lignin Removed,[3] % of Original Lignin	Yield,[2] %	Lignin in Product, %	Lignin Removed,[3] % of Original Lignin
100	82.4	15.2	16.5	93.4	29.4	0.9
130	77.7	10.1	44.6	89.4	24.9	11.1
155	72.4	7.5	58.8	84.4	22.0	21.4
169	68.4	1.3	92.9	77.4	15.3	45.4
170 (refluxed)	67.6	0.57	96.9	73.9	12.0	57.2

[1] Time, 5 hours; ratio of chemical to moisture-free alcohol-benzene extracted wood, 50:1.
[2] Based on percentage of moisture-free alcohol-benzene extracted original wood.
[3] Based on percentage of original lignin in moisture-free alcohol-benzene extracted wood.

TABLE IV.—EFFECT OF PARTICLE SIZE OF SAMPLE ON DELIGNIFICATION OF ASPEN BY MONOETHANOLAMINE [1]

Screen Size, mesh	Yield, %	Lignin in Product, %	Lignin Removed,[2] % of Original Lignin
35	70.7	1.6	89.6
35-60	69.6	1.5	90.6
60-80	68.4	1.3	90.7
80-100	68.0	1.8	89.1
100-115	67.0	2.0	87.0
115	65.8	2.3	85.4

[1] Time, 5 hours; temperature 168-170 deg. C.; ratio chemical to moisture-free alcohol-benzene extracted wood, 50:1.
[2] Based on percentage of moisture-free alcohol-benzene extracted original wood.
[3] Based on percentage of original lignin in moisture-free alcohol-benzene extracted wood.

None of the chemicals tried on largetooth aspen removed the residual lignin left by the action of monoethanolamine alone. In fact several of the chemicals added to monoethanolamine inhibited delignification (Table V).

Action of other Anhydrous Amines on Wood

The delignifying ability of several other anhydrous amines was examined. None of the amines examined was as effective as monoethanolamine and all of them

TABLE V.—EFFECT OF ADDED CHEMICALS ON DELIGNIFICATION BY MONOETHANOLAMINE [1]

SITKA SPRUCE Chemicals Used [2]	Time of Digestion, hours	Yield,[3] %	Lignin in Product, %	Lignin,[3] Basis Original Wood, %
Monoethanolamine, 50 g...	5	77.4	15.3	11.8
Sodium Hydroxide, 0.5 g..	1	69.6	7.1	4.9
Sodium Hydroxide, 0.5 g..	2	64.5	3.0	1.9
Sodium Hydroxide, 0.5 g..	3	62.0	2.3	1.4
Sodium Hydroxide, 0.5 g..	4	61.5	1.9	1.2
Sodium Hydroxide, 0.5 g..	5	58.1	2.1	1.2
Sodium Hydroxide, 0.25 g.	3	69.0	5.6	3.9
Sodium Hydroxide, 0.25 g.	5	62.4	4.3	2.7
Ammonia, 2% monoethanolamine sol'n..	5	83.7	20.6	17.2
Ammonia, 10% monoethanolamine sol'n..	5	88.7	24.7	21 9
Iodine, 0.5 g.....	5	75.4	16.5	12.5
Phenol, 10 g.....	5	85.0	19.2	15.4
Glycol, 10 g.....	5	78.4	16.8	13.2
Aniline, 10 g.....	5	78.1	17.9	14.0
Furfural, 10 g.....	5	72.6	13.9	10.1
Morpholine, 10 g.....	5	75.6	18.1	13.7
Diethanolamine, 10 g.....	5	75.7	15.9	12.1
Triethanolamine, 10 g.....	5	78.3	19.5	15.3
Phenylethanolamine, 10 g..	5	76.1	16.4	12.4
Diethylene Triamine, 10 g.	5	74.0	16.4	12.2
Diethylaminoethanol, 10 g.	5	73.1	16.1	11.8
Glucose, 3 g.....	5	68.5	11.1	7.6
Glucose, 5 g.....	5	67.0	9.4	6.3
Glucose, 10 g.....	5	64.0	6.5	4.2
ASPEN				
Monoethanolamine, 50 g...	5	68.4	1.3	0.9
Glucose, 10 g.....	5	68.4	1.2	0.8
Camphor, 10 g.....	2	78.3	2.5	2.0
Fructose, 10 g.....	2	64.8	1.2	0.8
Lactose, 10 g.....	2	66.5	1.4	0.9
Mucic Acid, 10 g.....	2	67.6	2.8	1.9
Urea, 10 g.....	2	67.6	3.3	2.2
Acetophenone, 10 g.....	2	69.6	4.5	3.1
Tartaric Acid, 10 g.....	2	67.0	2.6	1.7
Diacetone Alcohol, 10 g...	2	68.5	3.7	2.5

[1] Temperature, 168-170 deg. C.; ratio ethanolamine to moisture-free alcohol-benzene extracted wood, 50:1.
[2] Chemicals in addition to 50 grams of monoethanolamine.
[3] Based on percentage of moisture-free alcohol-benzene extracted original wood.

removed appreciable quantities of carbohydrate material (Table VI).

Pretreatment of Wood Prior to Digestion in Monoethanolamine

A large number of experiments were carried out in which Sitka spruce was subjected to various relatively mild delignifying agents with the object in mind of pretreating the wood in such a manner that the monoethanolamine digestion would completely delignify the wood. Only a few of the large number of tests made showed favorable results (Table VII). Mild nitric acid digestion followed by dilute sodium hydroxide prior to the monoethanolamine digestions gave promising results, providing the concentrations were carefully adhered to.

Removal of Residual Lignin in Monoethanolamine Residues

Digestion of Sitka spruce monoethanolamine leaves a residue with appreciable quantities of lignin, and, in the case of aspen, the digestion must proceed longer than 5 hours before the residual lignin is reduced to 1% or less. Similar observations were made by Wise, Peterson, and Harlow *(15)* and by Reid, Nelson, and Aronovsky *(10)*. The former workers used chlorine water and sodium sulphite to whiten the cellulose and the latter found two treatments with acidified 5% sodium hypochlorite effective in removing most of the residual lignin.

Orientation experiments showed crude monoethanolamine cellulose from Sitka spruce particularly hard to bleach with calcium hypochlorite or sodium hypochlorite under various conditions, although the crude aspen cellulose was more readily bleached.

By Chlorine Water and Sodium Sulphite

Air-dry samples of Sitka spruce and aspen were digested in monoethanolamine for different periods of time and washed. Chlorine water in an amount equivalent to a desired number of grams (as, for example, 0.2) of chlorine per gram of original wood

TABLE VI.—DELIGNIFICATION OF ASPEN BY VARIOUS ANHYDROUS AMINES[1]

Amine Used	Yield,[2] %	Lignin in Product, %	Lignin[2] in Original Wood, %
Phenylethanolamine	79.7	17.8	16.1
Diethylenetriamine	56.0	5.8	3.3
Diethanolamine	69.9	6.3	4.5
Triethanolamine	71.8	13.8	10.2
Diethylaminoethanol	76.9	19.8	16.0
Monoethanolamine	68.4	1.3	0.9

[1] Temperature, 168-170 deg. C.; time, 5 hours; ratio amine to moisture-free alcohol-benzene extracted wood, 50:1.
[2] Based on percentage of moisture-free alcohol-benzene extracted original wood.

TABLE VII.—EFFECT OF PRETREATMENTS ON DELIGNIFICATION OF SITKA SPRUCE BY MONOETHANOLAMINE[1]

Pretreatment	Yield,[2] %	Lignin in Product, %	Lignin,[2] Basis Original Wood, %
None	77.4	15.3	11.8
Stage 1—2% Nitric Acid, 1 hr., 95° C. Stage 2—1% Sodium Hydroxide, 30 min., 95° C.	69.0	1.5	1.0
Stage 1—4% Nitric Acid, 1 hr., 98° C. Stage 2—2% Sodium Hydroxide, 45 min., 98° C.	43.1	...	...
Chlorine Gas, 5 min.; 2% Sodium Sulphite, 30 min. boil	73.1	12.3	9.8
Above treatment (2 times)	63.4	5.3	3.4
Above treatment (3 times)	62.6	3.9	2.4

[1] Monoethanolamine digestion, 5 hr., 168-170 deg. C.; ratio of chemical to moisture-free alcohol-benzene extracted wood, 50:1.
[2] Based on percentage of moisture-free alcohol-benzene extracted original wood.

TABLE VIII.—DELIGNIFICATION STUDIES BY MONOETHANOLAMINE FOLLOWED BY CHLORINE WATER[1]

Time of Monoethanolamine Digestion, hours	Chlorine Water Treatments, no.	Yield,[2] %	Lignin in Product, %
Sitka spruce (alc.-benz. extd.)			
5	none	77.4	15.3
5	1 (weak chlorine water)	68.1	3.4
5	2 (weak chlorine water)	64.8	0.7
5	4 (weak chlorine water)	61.6	0.1
5	1 (0.2 g. chlorine/g. sample)	63.1	0.7
5	2 (0.2 g. chlorine/g. sample)	61.6	0.2
2	1 (0.2 g. chlorine/g. sample)	63.7	0.7
2	2 (0.2 g. chlorine/g. sample)	61.7	0.3
1	1 (0.2 g. chlorine/g. sample)	65.5	0.8
1	2 (0.2 g. chlorine/g. sample)	62.1	0.3
2	2 (0.4 g. chlorine/g. sample)	61.6	0.2
2	3 (0.4 g. chlorine/g. sample)	61.1	0.2
Aspen (alc.-benz. extd.)			
5	none	68.4	1.3
5	1 (weak chlorine water)	66.6	0.2
5	3 (weak chlorine water)	66.3	0.1
2	1 (0.2 g. chlorine/g. sample)	67.7	0.4
2	2 (0.2 g. chlorine/g. sample)	67.6	0.2
1	1 (0.2 g. chlorine/g. sample)	68.1	0.6
1	2 (0.2 g. chlorine/g. sample)	67.6	0.2
2	2 (0.4 g. chlorine/g. sample)	67.9	0.0
Beech (alc.-benz. extd.)			
2	2 (0.4 g. chlorine/g. sample)	64.0	0.1
Fire-cherry (alc.-benz. extd.)			
2	2 (0.4 g. chlorine/g. sample)	67.5	0.4
White oak (hot water extd.)			
2	2 (0.4 g. chlorine/g. sample)	65.4	0.5
Western larch (alc.-benz. and hot water extd.)			
2	2 (0.4 g. chlorine/g. sample)	61.0	0.2
2	3 (0.4 g. chlorine/g. sample)	60.2	0.1
Shortleaf pine (alc.-benz. extd.)			
2	2 (0.4 g. chlorine/g. sample)	63.0	0.9
2	3 (0.4 g. chlorine/g. sample)	61.4	0.4
Douglas fir (alc.-benz. extd.)			
2	2 (0.4 g. chlorine/g. sample)	62.1	0.7
2	3 (0.4 g. chlorine/g. sample)	60.3	0.2
Redwood (alc.-benz. extd.)			
2	2 (0.4 g. chlorine/g. sample)	60.0	0.7
2	3 (0.4 g. chlorine/g. sample)	57.8	0.2

[1] Digested in monoethanolamine at 168-170 deg. C.; ratio of chemical to wood, 50:1, followed by chlorine water as noted.
[2] Yields of Sitka spruce, aspen, shortleaf pine based on moisture-free alcohol-benzene extracted wood; yield of white oak based on moisture-free hot water extracted wood; yields of beech, fire cherry, western larch, Douglas fir, and redwood based on moisture-free original (unextracted) wood. All samples were alcohol-benzene extracted before monoethanolamine digestion except white oak which was hot water extracted.

sample (not of residual crude cellulose) was added to the cellulose in a beaker. The chlorine water treatment, washing and sodium sulphite digestion were carried out as described above under "Procedures."

Treatment of the crude cellulose residues of Sitka spruce and aspen with chlorine water and sodium sulphite effectively completes the delignification (Table VIII). The time of monoethanolamine digestion may be shortened to 1 hour at which point the crude aspen residue contains about 9% lignin and the Sitka spruce contains about 22% lignin. Two subsequent chlorine water and sodium sulphite treatments effectively delignify the crude cellulose. The product is white in the case of aspen but the Sitka spruce cellulose, although having a residual lignin content of 0.25%, retains considerable color.

Increasing the amount of chlorine used to 0.4 grams per gram of original wood sample and employing this concentration on cellulose residues after 2 hours of monoethanolamine digestion improved the whiteness of the product without any change in yield of aspen or Sitka spruce. The residual lignin was negligible. These conditions were than applied to several other species, yielding essentially lignin-free hardwood celluloses, although some of the softwood celluloses contained residual lignins in amounts approaching 1%. Three chlorine water-sodium sulphite treatments, however, gave essentially lignin-free soft-

wood celluloses although the yields were lowered somewhat (Table VIII).

By Sodium Chlorite

Sodium chlorite has recently been shown *(12, 13)* to be a good bleaching agent which has little effect on the viscosity of the cellulose, hence causing no degradation. Acidified sodium chlorite (pH 4.5) has little hydrolytic action since ClO_2 is formed which is taken up by oxidizable matter. An investigation of the results of sodium chlorite treatments following different periods of monoethanolamine digestion shows that a 2-hour digestion in monoethanolamine followed by 2 sodium chlorite treatments delignify hardwoods, but with the exception of redwood, the softwood celluloses still contain appreciable lignin (Table IX).

Proposed Monoethanolamine Analytical Method

From a consideration of the above data the following method was adopted:

Approximately 2 grams of 60-80 mesh alcohol-benzene extracted sample (air-dry or moisture-free) are accurately weighed and placed in a 250-cc. Erlenmeyer flask. Fifty parts by weight of anhydrous, water-clear monoethanolamine (b.p. 168-170 deg. C) is added per part of moisture-free sample. The flask is covered with a watch glass and immersed in an oil bath kept at 168-170 deg. C. After 2 hours digestion the flask is removed from the bath and allowed to stand 3 minutes. The contents are diluted with a volume of water equal to that of the monoethanolamine and filtered through a tared medium porosity fritted glass crucible. Wash the residue with 500 cc. of cold distilled water.

Transfer the wet cellulosic residue to a 250-cc. beaker and add a volume of fairly strong (ca. 10 grams per liter), freshly prepared cold chlorine water sufficient to give 0.4 gram of available chlorine per gram basis of original wood sample. Allow this mixture to stand 5 minutes at room temperature and filter into the same tared fritted glass crucible. Wash successively with 50 cc. of ⅔% sulphur dioxide water, 50 cc. of cold water, 50 cc. of 2% sodium sulphite solution, and finally with water. Add an amount of hot 2% sodium sulphite sufficient to cover the material in the crucible and place the crucible in a 250-cc. beaker to which is added sufficient hot 2% sodium sulphite to surround the crucible. Boil gently for 30 minutes and stir the sample in the crucible frequently with a pointed glass rod. Remove the excess sodium sulphite solution by suction and wash the sample thoroughly with cold water. For hardwoods repeat the above chlorine water-sodium sulphite treatment once more and for softwoods repeat twice more. Finally wash the cellulose thoroughly with 500 cc. of water, then 50 cc. of acetone; dry to constant weight.

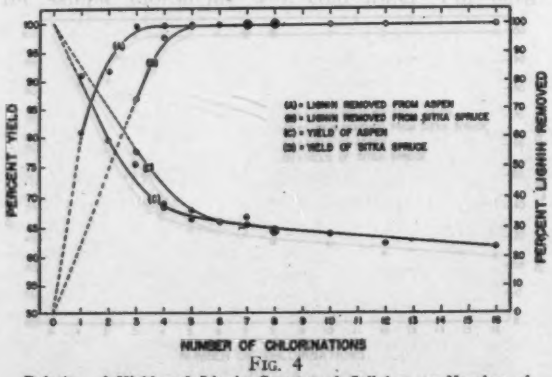
(A) = LIGNIN REMOVED FROM ASPEN
(B) = LIGNIN REMOVED FROM SITKA SPRUCE
(C) = YIELD OF ASPEN
(D) = YIELD OF SITKA SPRUCE
PERCENT YIELD
PERCENT LIGNIN REMOVED
NUMBER OF CHLORINATIONS

Fig. 4
Relation of Yield and Lignin Content of Cellulose to Number of Chlorinations.

TABLE IX.—DELIGNIFICATION BY MONOETHANOLAMINE FOLLOWED BY AQUEOUS SODIUM CHLORITE[1]

Time of Monoethanolamine Digestion, hours	Sodium Chlorite Treatments, no.	Yield,[2] %	Lignin in Product, %
Aspen			
1	1	69.8	1.6
2	1	65.9	1.6
3	1	65.8	1.4
4	1	65.4	1.4
5	1	65.6	0.7
1	2	69.4	1.0
2	2	66.8	0.3
Beech			
1	1	68.3	2.9
2	1	63.5	1.9
3	1	63.0	1.6
4	1	62.2	1.7
5	1	61.7	1.0
1	2	67.0	1.4
2	2	63.9	0.3
Fire Cherry			
1	1	70.4	1.5
2	1	67.3	1.4
3	1	66.0	1.3
4	1	65.7	1.1
5	1	65.2	0.7
1	2	69.3	0.8
2	2	68.2	0.2
White oak			
2	2	59.7	0.7
Sitka spruce			
2	2	66.8	3.2
Shortleaf pine			
2	2	61.2	1.5
Douglas fir			
2	2	66.1	2.5
Redwood			
2	2	57.8	0.3
Western larch			
1	1	68.8	4.4
5	1	54.3	3.3
1	2	65.9	3.1
2	2	65.9	3.1

[1] Digested in monoethanolamine at 168-170 deg. C.; ratio chemical to wood, 50:1; followed by aqueous $NaClO_2$ treatment using 2 g. $NaClO_2$ per g. sample for 15 min. at 95-100 deg. C., acidified with 0.5 cc. 10% HCl. Finally washed with water.

[2] Based on moisture-free original (unextracted) wood. All samples were alcohol-benzene extracted before monoethanolamine digestion, except white oak, which was hot water extracted.

Comparison of Monoethanolamine and Cross and Bevan Cellulose

The properties of monoethanolamine cellulose from aspen and Sitka spruce were compared with celluloses from these same species isolated by the usual Cross and Bevan method and by the use of chlorine water. The customary procedure for preparing Cross and Bevan cellulose was followed (see "Procedures"). The crucible weights had to be checked at the end of each quantitative experiment since 8 sodium sulphite treatments caused appreciable loss in weight (4-11 mg.). Ten determinations gave 64.1, 64.4, 64.4, 64.2, 64.5, 64.6, 64.2, 64.5, 64.3, 64.3% based on the moisture-free alcohol-benzene extracted aspen wood.

Despite these checks there was no evidence that this method—i.e., using 8 chlorinations which were required to reach the complete disappearance of the Maüle color, was more than purely arbitrary. The percentage lignin was negligible (0.1%) and the cellulose was hard to wash, tended to gelatinize, and it was best to give a final wash with alcohol followed by ether.

To determine whether or not complete delignification had occurred prior to the eighth chlorination a series of cellulose preparations were made from both aspen and Sitka spruce of different numbers of chlorinations.

TABLE X.—YIELD AND LIGNIN VARIATION IN ASPEN AND SITKA SPRUCE AFTER SUCCESSIVE CHLORINATION TREATMENTS[1]

Chlorinations, no.	Yield,[2] %	Lignin in Residue, %	Lignin[3] Removed, %	Color, Maule Reaction	% Alpha-Cellulose in C & B Cellulose	% Alpha-Cellulose Calc'd on orig. wood
Aspen						
1	91.8	7.5	61.5	brilliant red	...	...
2	79.4	1.3	83.4	brilliant red	...	...
3	75.2	0.3	99.0	brilliant red	...	...
4	68.1	0.2	99.3	decidedly pink	69.6	47.4
5	66.4	0.1	99.7	faint pink	70.1	46.5
6	65.7	0.1	99.7	very faint pink	70.7	46.5
7	65.2	0.1	99.7	hardly perceptible	72.0	46.9
8	64.4	0.1	99.7	colorless	73.0	47.0
Sitka spruce						
3	77.4	9.4	73.4	brilliant red brown	...	...
4	68.9	2.0	95.1	decidedly brown	...	...
5	67.3	0.5	98.8	brown	...	...
7	66.7	0.3	99.4	light brown	...	...
8	64.6	0.2	99.6	light brown	...	...
10	64.0	0.2	99.6	very light brown	...	...
12	62.3	0.2	99.6	very faint brown	...	...
16	61.8	0.1	99.8	hardly perceptible	...	...

[1] Chlorinations by bubbling gas through moist sawdust samples at rate of 120 bubbles per minute for 3 minutes, then washed with water, sulphur dioxide water, boiled 0.5 hr. in 2% sodium sulphite.
[2] Based on moisture-free alcohol-benzene extracted original wood.
[3] Based on percentage of lignin originally present.

The relation of the yield, residual lignin and Maüle color reaction to the number of chlorinations was studied (Table X and Fig. 4). From the figures it is evident that essentially complete delignification of aspen had occurred after 5-6 chlorinations, and for all practical purposes a delignified aspen cellulose may be considered obtained from 4 chlorinations, and delignified Sitka spruce cellulose after 7 chlorinations. The persisting light pink or brown color is not necessarily correlated with lignin content and requires considerable further chlorination before all traces of it disappear. The alpha-cellulose content of the aspen cellulose based on the moisture-free wood does not change materially with increase in the number of chlorinations after the 4th chlorination.

Aspen and Sitka spruce celluloses for comparative study were also prepared by the use of chlorine water, using 5 aqueous chlorine treatments, as described under "Procedures."

Aspen monoethanolamine cellulose was prepared for the comparative study by two methods. The first preparation was made by digesting for 5 hours in monoethanolamine at 168-170 deg. C, and then subjecting the residue to three successive chlorine water (5 minutes) and sodium sulphite digestions. The second preparation was made by the proposed monoethanolamine analytical method (2 hours monoethanolamine digestion and 2 chlorine treatments). Sitka spruce monoethanolamine cellulose was made in the same way as the second preparation of aspen cellulose, except that the material was given 3 chlorine water treatments.

A comparison of the properties of the above celluloses shows that the monoethanolamine procedure is as effective in removing lignin as is the Cross and Bevan method (Table XI). The yield of aspen monoethanolamine cellulose at the same extent of delignification taken from the curve of Fig. 4 is practically identical to that of the Cross and Bevan cellulose but is appreciably lower in the case of Sitka spruce. The pentosan contents are nearly the same in the different celluloses for a given species, but the alpha content of the monoethanolamine celluloses is a little higher. However, the viscosity of the aspen monoethanolamine cellulose is lower than that of the Cross and Bevan cellulose.

Conclusion

The chemical characteristics of monoethanolamine cellulose and of Cross and Bevan cellulose are broadly similar. However, the residual cellulosans may differ, due to a different selective action on the total hemicellulose and cellulosan content of the wood by the two types of reagents. The subsequent treatment of the monoethanolamine cellulose by chlorine water and sodium sulphite probably tends to bring the monoethanolamine cellulose nearer to the Cross and Bevan type.

There is some physical difference between the monoethanolamine and Cross and Bevan celluloses. Generally, it is more difficult to get a pure white cellulose by the monoethanolamine method than by chlorination, despite the fact that delignification is complete. The particles of the monoethanolamine cellulose are more discrete and resemble the original wood particles. There is little tendency to gelatinize and hence filtrations and washings are no problem in preparing monoethanolamine cellulose. This is the most important advantage of the monoethanolamine method over the Cross and Bevan. The manipulation time saved by the former method is great, most especially so in the analysis of softwoods.

Another decided advantage of the monoethanolamine method is that the "personal equation" in the interpretation of the Maüle end point is eliminated. In the Cross and Bevan method delignification occurs long before the Maüle color reaction disappears, the color often persisting moderately to faintly through a number of further chlorinations.

There is a marked difference in the behavior of hardwoods and softwoods to monoethanolamine; the former delignify easily and the latter with difficulty.

Unfortunately, like all other cellulose procedures proposed, the monoethanolamine method is arbitrary. A definite procedure must be followed, which will

TABLE XI.—COMPARISON OF PROPERTIES OF CELLULOSE PREPARED BY MONOEHTANOLAMINE AND CHLORINATION METHODS

Analysis	Aspen Monoethanolamine Cellulose: 5 hr. Digestion & 3 Chlorinations	Aspen Monoethanolamine Cellulose: 2 hr. Digestion & 2 Chlorinations	Aspen Cross and Bevan Cellulose: 6 Chlorinations	Aspen Cross and Bevan Cellulose: 8 Chlorinations	Aspen Chlorine Water Cellulose, 5 Chlorine Water Treatments	Sitka Spruce Monoethanolamine Cellulose, 2 hr. Digestion, 2 Chlorinations	Sitka Spruce Cross and Bevan Cellulose, 7 Chlorinations	Sitka Spruce Chlorine Water Cellulose, 5 Chlorine Water Treatments
Yield[1]	66.3	67.9	65.7	64.4	67.2	62.0	66.7	64.5
Residual lignin in Cellulose	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2
Residual lignin, basis moisture-free extd. wood	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Pentosans in Cellulose	23.3	22.5	21.6	21.2	22.8	6.8	6.0	5.5
Pentosans, basis moisture-free extd. wood	15.4	15.2	14.2	13.7	15.3	4.2	4.0	3.5
Alpha-cellulose content	73.3	74.2	70.7	73.0	73.2	78.2	70.2	71.3
Alpha, basis moisture-free extd. wood	48.5	50.4	46.5	47.0	49.3	48.5	46.8	45.9
Viscosity of Cellulose (cps.)	67.0	73.2	121.0	105.0	116.0	74.5	72.5	90.5

[1] Basis moisture-free alcohol-benzene extracted wood.

give consistent results with a high degree of precision.

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TAPPI Chip Packing Survey

By Vance P. Edwardes[1]

Last fall the Office of Production Management, now the War Production Board, estimated that the sulphite shortage in this country, including Canadian imports, would amount to about 15% for the year 1942. In previous years Europe furnished about 20% of our sulphite but with that source of supply cut off and the increased demands for war purposes, it appeared that a shortage would develop.

The Technical Association of the Pulp and Paper Industry undertook a survey of sulphite mills in this country and Canada using chip packers of various types in order to determine what increase in digester production could be secured by the installation of packers in the mills not so equipped.

Chip packers or better still, chip distributors, permit increase of digester capacity with the least dollar or critical material expense without the drawback of decreasing pulp quality. On the contrary, percentage yield, pulp quality and uniformity are improved and tailings decreased, even on direct steamed, noncirculated digesters.

The survey is disappointing in that not more mills reported, but it is sufficient to show what can be accomplished by use of the proper type of packer in the proper way.

In Table I the packers have been divided into groups: mechanical, Kimberly-Clark, American

[1] Member TAPPI. Vice President of the Technical Association of the Pulp and Paper Industry; Sulphite Production Manager, International Paper Co., Palmer, N. Y.

TABLE I

Mill	No. of digesters	Digester volume, cu. ft.	Wood moisture, %	Average specific gravity, moisture free	Chip weight per cu. ft. Unpacked	Chip weight per cu. ft. Packed	Increase by packing, %	Time to fill Unpacked	Time to fill Packed	
MECHANICAL										
1	3	7950	26.5	0.41	8.73	10.00	14.55	20	45	Hot acid—direct steam
2	4	3092	36.0	0.43	9.35	9.65	3.22	60	75	Cold acid—direct steam
3	7	6458	46.0	0.35–0.42	10.60	11.34	7.00	16	27	Cold acid—direct steam—forced circulation
4	3	5625	31.0	...	7.80	9.60	17.50	20	30	Cold acid—direct steam—forced circulation
Total	17				Weighted Average		10.00			
KIMBERLY-CLARK										
5	6	3400	40–50.0	0.38–0.42	9.20	11.05	20.10	25	40	Cold acid—forced circulation and indirect heating—additional 5% increase in pulp yield
6	3	5750	40–45.0	0.38–0.42	9.50	12.20	28.40	20	40	Cold acid—forced circulation and indirect heating—additional 5% increase in pulp yield
7	8	5700	45.0	0.45	9.50	10.70	12.60	25	35	Hot acid—direct steam
8	4	5396	35.0	0.36	9.40	10.00	5.00	15	40	Hot acid—direct steam
9	3	4546	25.0	...	9.15	10.75	15.00	60	60	Cold acid—forced circulation and indirect heating
10	1	5883	25.0	...	8.97	10.54	15.00	60	60	Cold acid—forced circulation and indirect heating
11	1	7953	27.0	0.38	8.30	11.01	25.00	25	45	Cold acid—forced circulation and indirect heating—additional 5% increase in pulp yield
12	4	3510	27.0	0.38	7.90	10.95	30.00	20	42	Cold acid—forced circulation and indirect heating—additional 5% increase in pulp yield
13	3	3950	28.0	0.41	8.20	10.00	21.00	40	60	Cold acid—forced circulation—direct steam
14	5	4478	30.0	0.37	7.33	9.75	25.00	16	50	Hot acid—forced circulation—indirect heating—additional 5% increase in pulp yield
Total	38				Weighted Average		20.65			
AMERICAN LURGI										
15	2	4225	26.0	0.33–0.43	8.75	10.25	20.00	8	15	Hot acid—forced circulation
16	1	4225	26.0	0.33–0.43	8.75	10.25	20.00	8	15	Hot acid—direct steam
17	1	6193	26.0	0.33–0.43	8.75	10.25	20.00	15	25	Hot acid—forced circulation
18	6	3730	24.5	...	10.80	13.15	22.80	24	28	Hot acid—forced circulation
19	4	4147	25.6	...	...	....	7.50	16	28	Hot acid—direct steam
Total	14				Weighted Average		9.24			
STEAM										
20	1	2775	26.0	0.42	9.20	10.00	8.00	20	20	Cold acid—direct steam
21	1	4553	26.0	0.42	9.20	10.00	8.00	20	20	Cold acid—direct steam
22	1	4409	26.0	0.42	9.20	10.00	8.00	20	20	Cold acid—direct steam
23	1	4436	26.0	0.42	9.20	10.00	8.00	20	20	Cold acid—direct steam
24	4	5767	46.0	0.40	9.70	10.27	5.94	93	147	Hot acid—direct steam
25	3	3600	25.0	0.39	8.30	8.90	7.00	20	30	Hot acid—direct steam
26	6	7276	43.5	0.39	9.87	11.08	12.20	16	21	Hot acid—direct steam
27	2	4630	44–49.6	0.41	10.40	11.80	13.50	..	40	Hot acid—direct steam
28	5	8300	30–55.0	0.33	7.84	10.10	30.10	40	50	Hot acid—direct steam
29	2	8000	28–56.0	0.33	...	....	15–18.00	40	40	Hot acid—direct steam
30	2	3750	46.0	0.35	8.90	10.40	15.00	20	40	Cold acid—direct steam—forced circulation
31	1	2900	30.0	0.37	7.33	9.40	28.00	12	35	Hot acid—direct steam—forced circulation
Total	29				Weighted Average		15.08			

Lurgi, and steam, the latter probably represented largely by the Svensson. It will be noted that apparent discrepancies and wide divergence of results have been reported but all received were included.

Other savings besides increased production are the direct result of charging more chips into the digesters. Less acid is used, and therefore less steam is required per ton. Sulphur is reduced by a relatively small amount. Pulp yield is increased, whether direct cooked or circulated, due to more uniform temperature distribution within the digester.

The question of digester hang-ups being caused by chip packing is often raised. While this trouble has been experienced in some mills, it is most likely that packing was not the direct cause. Acid concentration probably entered into it but more important is the size and design of the bottom sleeve, cross, blow valve, and blow pipe. It has been stated that if hang-ups were not experienced prior to packing, there is no logical reason for packing to cause them. Hang-ups will not occur in any digester which blows in 10 minutes or less.

Twenty-one different companies are represented in Table I and 98 digesters varying in size from approximately 2800 to 8300 cubic feet with digestion equipment covering every combination met in practice. Wood moisture varies from 26 to 56% and specific gravity from 0.33 to 0.43. In no case can differences in percentage increase of digester chip capacity be related to digester size, wood moisture, or gravity. It is evident, therefore, that the method employed in filling, even with the same equipment, is at fault where increases appreciably lower than the average are secured.

The sulphite pulp production for 1941 was approximately 2,600,000 tons and it is estimated the mills reporting on this survey normally produce 802,000 tons, leaving approximately 1,800,000 tons of production which could be increased by at least an average of 15% to 1,072,000. If the maximum increase could be secured, more than enough additional sulphite pulp could be produced to satisfy the estimated demand with the expenditure of the least amount of capital or critical materials. Further, those mills reporting increases less than the average should study their operation in order to so improve methods as to reach the maximum reported by mills similarly equipped.

Recovery of Fats, Waxes, Resins, and Turpentine from Wood

By Mark W. Bray[1]

Owing to the shortage of fats in this country as a result of the war, considerable interest in new sources of these strategic materials has recently developed. Some of the possibilities of recovering fats from the 16 million cords of wood consumed yearly by the pulping industry are herein discussed.

Fats and waxes are biological products of the life cycle of nearly every growing plant; in many instances they are much more abundantly produced by other plant forms than trees. Under stress of war or other necessity, the Nation could no doubt obtain these substances from its forest sources to a greater extent than is practical under normal conditions, when such developments advance in a much less spectacular fashion, since they have then to compete with existing sources. It is estimated, for example, that by one process 40,000 tons of fatty acids might be produced annually as a byproduct from sulphate black liquor before it is burned. Although this amount of fat is only a small portion of the total annual fat consumption in the United States, it is no doubt worth recovering.

The presence of these components in wood has been recognized for many years. They come under the head of "extractives" in wood chemistry.

Extractives also include the resinous, pitchy substances, essential oils, etc. In their textbood, Hawley and Wise *(1)* cite various references relating to the presence of fixed oils and fats, some of them as early as 1890. In 1917 Schorger *(2)* of the Forest Products Laboratory worked out methods for the determination of the fatty, waxy, and resinous components in the southern pines and other species.

Since 1930, several papers have been published by Sherrard and Kurth *(3)* relative to the distribution of extractives in the southern pines. According to these authors, the extractive content of the southern pines is variable both as to the species, individual trees, and different parts of the same tree. In this work the ether extract of several species of second-growth southern yellow pines, which would contain the fatty and waxy materials, averaged from 2.2 to 3.8%, although in certain parts of the stick, particularly toward the center of the bolt or pith, it ran as high as 21%. Of this ether extractive material as obtained from the sapwood, about 65% consisted of fatty acids and the remainder, resin acids. These ratios were reversed in the heartwood.

On the basis of the lowest figure, 2.2% extractives in the wood, of which 65% are fatty acids, a yield of approximately 51 pounds of fatty acids and 28 pounds of resinous acids could be recovered from the wood required to produce a ton of air-dry sulphate pulp. Since according to the U. S. Bureau of the Census, 3,725,135 tons of sulphate pulp were manufactured in the United States in 1940, of which approximately 80% (2.97 million tons) was made in the south, aproximately 75,735 tons of fatty acids might have been recovered in the south alone.

In old virgin-growth slash pine *(3)*, the ether extractives were much higher, varying from 2.3% in the sapwood to 23.95% in the heartwood of the butt logs and from 3.5% in the sapwood to 51.6% in the heartwood of the upper portions of the tree. Among the materials identified in the ether extract were oleic and linoleic acids, solid fatty acids, and resin acids, all of which are saponifiable, and a phytosterol in the unsaponifiable portion of the ether extract.

[1] Member TAPPI, Senior Chemist, Forest Products Laboratory (maintained at Madison, Wis., in cooperation with the University of Wisconsin), Forest Service, U. S. Department of Agriculture.

Hall *(4)* published a complete analysis of the fats, resins, and waxes in the phloem or inner bark and growing tips of slash pine.

Richter *(5)* reports the ether extractives of spruce, fir, beech, rock maple, white birch, yellow birch, and white maple both in the sapwood and in the heartwood and in the inner and outer barks of these species. For spruce and white birch, and the sulphite pulps made from them, he breaks down his ether-soluble fraction into resin acids, fatty acids, fats, and unsaponifiable matter, which consists of sterols, resenes, and polymerized terpenes.

For example, the ether extractive of green spruce wood (0.7 to 1.5% of the weight of moisture-free wood) consisted of 29.0% resin acids, 17.5% fatty acids, 24.6% fats, and 19.8% unsaponifiable sterols, resenes, and polymerized terpenes, while for white birch wood (3.0%) there were 31.1, 6.1, 24.9, and 30%, respectively, of these components. The ether extractives in the sulphite pulp from spruce (approximately 2.0%) contained 10.6% resin acids, 22.6% fatty acids, 20.3% fats, and 33.3% unsaponifiable matter, while those in the white birch sulphite pulp (3.1 to 4.3%) consisted of 3.1, 11.8, 29.0, and 44.7%, respectively.

In general, it is shown by various chemists that storage of the wood after cutting considerably decreases the percentage of ether extractives. Oxidation by air no doubt changes the character of these substances.

It is also well known that the extractives of wood are highly concentrated in the ray cells and other parenchyma tissue. Such components are believed formed in the inner bark or cambium and pass into the heartwood through the ray cells. Means have been devised by a western paper mill for separating the ray cells in sulphite pulp from the other fibers, thus affording a possible way of recovering some of these extractives. By this method, about 10% of the pulp substance is separated in the form of ray cells which, if properly extracted to remove the ether-soluble fats, waxes, and resins, would afford a source of fats and waxes, and, moreover, leave the remainder of the pulp in purer form. The success of the method with sulphite pulp results from the acid nature of the cooking liquors which have little or no dispersing action on the fats and resins present in the ray cells, thus preventing them from leaching out into the pulp mass.

With the sulphate and soda processes, however, this screening method is not so effective because the alkaline liquors solubilize the fats, waxes, and resins, thus causing distribution of the extractives on all the pulp fibers and in the spent liquors.

Although the technological importance of recovering these substances from wood and pulp is recognized, practical and economical methods for their separation are not known to be available. The comparatively small amount of extractives present, 2 to 4% in the second-growth southern pines, is hardly enough to attempt their extraction from the wood previous to pulping, as efficient solvent recovery would be necessary to make the extraction at all feasible. In addition, steaming of the chips to recover the solvent remaining in them tends to hydrolyze the cellulose and produce pulps of inferior strength properties.

In the case of southern pine stumpwood, the extractives content of which averages 25% and consists largely of resin acids, recovery of these substances has been found to be economically feasible. Several commercial concerns are now operating in the south on this material, manufacturing wood rosin. The extracted chips in this case have been found to be unsuitable for the production of high-quality kraft pulps.

Perhaps the best method for recovering a part of the fatty acids and resin acids at present is a process which removes these acids from the spent or black liquor of the sulphate and soda pulping processes. For a number of years in Europe, and more recently in the United States, a product known as "tall oil" or "tallöl" has been recovered from this black liquor. It has found a market in the production of various products such as soaps, pulp sizing agents, greases, and emulsifying agents.

Although corrosion difficulties resulted in the closing of one plant operated in connection with a southern paper mill, a number of southern mills are successfully recovering and refining tall oil, from which the obtain fatty and resin acids. Other sulphate pulp manufacturing concerns including several northern mills are contemplating the recovery of liquid rosin and turpentine. Incidentally, spirits of turpentine, alpha-pinene, is also recovered when the pines are pulped by the sulphate process, and para-cymene when spruce is pulped by the sulphite process. Sutermeister *(6)* in quoting Blengsli states that the turpentine production possible in the sulphate pulp industry is about 11 million gallons of crude material per year, but in 1938 only 2 million gallons were actually recovered.

The composition of tall oil is not constant, owing to variations in the ratio of resin to fatty acids which occur in the wood. Analyses of this substance show from 35 to 45% of resin acids, 45 to 55% of fatty acids, and from 8 to 11% of unsaponifiable matter consisting of sterols, resenes, and polymerized terpenes. Usually it is sold as about 90% saponifiable or useful. Sulphate black liquor contains about 50 pounds of tall oil per ton of air-dry pulp manufactured, of which 90% is saponifiable (45 pounds of fatty and resin acids, in approximately equal proportions). Therefore, the amount of fatty acids recoverable from the entiré United States sulphate pulping industry would be approximately 40,000 tons per year, together with an equal amount of resin acids.

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Hooker Gets Army-Navy Award

Hooker Electrochemical Company's Niagara Falls plant has been selected to receive the new joint Army-Navy Production Award in recognition of outstanding performance in the production of war materials. This award is the first given to a chemical manufacturer in the New York Chemical Procurement District. Appropriate ceremonies at the plant will mark the presentation to be made at Niagara Falls on September 8. Prominent Army, Navy, State and Civic officials as well as prominent chemists, engineers and educators are expected.

IMPORTS OF PAPER

NEW YORK IMPORTS

WEEK ENDING AUGUST 29, 1942

SUMMARY

Newsprint ..... 2,604 rolls

NEWSPRINT

——, ——, ——, ... 2358 rolls
——, ——, ——, ... 246 rolls

CASEIN

C. M. Loeb, Rhoades Co., ——, ——, ... 1251 bags
Breakstone Bros., ——, ——, ... 584 bags
C. M. Loeb, Rhoades Co., ——, ——, ... 425 bags

GLUESTOCK

Darstadt Scott & Courtney, ——, ——, ... 100 bls.
——, ——, ——, ... 116 bls.

BONES

Armour & Co., ——, ——, ... 830 bags
Hafleigh & Co., ——, ——, ... 4922 bags
C. Hollinshed Co., ——, ——, ... 2786 bags
——, ——, ——, ... 3076 bags

N. E. Paper Merchants Meet in Boston

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., August 31, 1942—Matters of vital importance to the general distributing trade were discussed at a Regional Meeting held by the National Paper Trade Association of the United States at the Hotel Touraine, August 25, with Robert H. Ziegler, assistant secretary of the Association, as the speaker. Harry J. Dowd, of the H. J. Dowd Company, Inc., Cambridge, Mass., president of the New England Paper Merchants Association, presided and introduced Mr. Ziegler.

Among those present were the following paper merchants:

Andrews Paper Company, Boston, represented by Frank H. Merrill and F. Herbolzheimer; the Arnold-Roberts Company, South Boston, Royden Loring and H. W. Ramsdell; Ralph F. Bass, Inc., Boston, Ralph F. Bass; Butler Paper Company, Springfield, Mass., William Butler; John Carter & Company, Inc., Boston, Leon M. Poore, Eugene R. Donnelly and E. H. Little; Carter Rice & Co., Corp., Boston, Charles A. Esty, Frank H. Winter, John R. Halkyard, E. Ashley Crowell and R. H. Welsh; Century Paper Company, Inc., Boston, Frank Halloran; The Chatfield Paper Company, New Haven, Conn., Ralph C. Chapman; The Minotte E. Chatfield Paper Company, New Haven, S. R. Chatfield; John S. Cheever Company, Boston, B. A. Jenkins; Cook-Vivian Company, Boston, C. H. Conroy; Cubell Paper Company, Inc., Cambridge, Arthur Cubell; Buckley, Dunton & Company, Boston, D. D. Darling; D. F. Monroe Company, Boston, F. H. Blackman and J. H. Blackman; Charles A. Esty Paper Company, Worcester, Mass., Merton C. Flemings and Freeman C. S. Frye; Fort Hill Paper Company, Boston, F. Bendel Tracy, John E. Roach and William C. Ross; Fall River Paper and Supply Corporation, Fall River, Mass., Morris Horvitz; G. & S. Paper Company, West Newton, Mass., J. L. Gilfix; Ginsburg Bros., Inc., Somerville, Mass., Samuel Ginsburg and Lee Flax.

R. L. Greene Paper Company, Providence, R. I., LeRoy M. Gardner; Howard Paper Company, Inc., Boston, William P. Watt; Hurlburt & Hatfield Company, Boston, H. A. Hurlburt; Industrial Paper & Cordage Company, Pawtucket, R. I., James C. Campbell, Newton T. Dana, H. B. Simmons and Henry W. Clark; Ingalls Cronin Company, Boston, John P. Ingalls; Judd Paper Company, Holyoke, Mass., W. H. Lippmann and Harold C. Scranton; Kendall Paper Company, Cambridge, D. L. Gibbs and Walter B. Carey; Mutual Paper Company, Boston, David Rabinowitz and Nathan Schwartz; Narragansett Paper Company, Providence, E. J. Davis; National Paper and Cordage Company, Boston, Harold Cubell; National Paper Company, New Bedford, Mass., Theodore Schwartz; Paper House of New England, Springfield, Charles Charnello; Perkins & Butler, Worcester, Mass., W. G. Butler; Portsmouth Paper Company, Portsmouth, N. H., S. Godman; Providence Paper Company, Providence, Milton Broome; Proctor Paper Company, Boston, Charles S. Proctor; Robbins Paper Company, Boston, G. T. Singleton; C. H. Robinson Company, Portland, Me., C. H. Robinson, Jr.; Rutter & McNaught, Inc., Boston, William E. McNaught and William H. Walpole; Service Paper Company, Pawtucket, Frank E. Rearson; Standard Paper Company, Lawrence, Mass., Fred B. Kfoury and Fred W. Nader; Star Paper Company, Haverhill, Mass., D. Dimopulos and Richard Wentworth; Stimpson, Incorporated, Boston, Samuel F. DeForest and E. O. Benson; Stone & Forsyth Company, Boston, Charles A. Burrell; Storrs & Bement Company, Boston, W. N. Stetson, R. B. Nichols, Paul M. Jones, Joe Porter and Philip Richardson; Sugarman Bros., Inc., Cambridge, Sydney Sugarman, H. Sugarman and Manuel Sugarman; R. W. Symons, Gardner, Mass., Richard W. Symons; Tileston & Hollingsworth Company, Boston, Amor Hollingsworth, Jr.; United Paper Company, Woonsocket, R. I., Abraham E. Goldstein; Von Olker-Snell Paper Company, Boston, Hubert W. Lockhart; Waltham Paper Products, Inc., Waltham, Mass., Maurice Crevoshay; Percy D. Wells, Inc., Boston, Joseph Porter; Whitney Bros., Inc., Boston, M. O. Byrne, Philip R. Byrne and W. J. Bigley; H. J. Dowd Company, East Cambridge, Harry J. Dowd.

Issues Report on Lake Sulphite

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., August 31, 1942—The official report of the settlement of claims of secured and unsecured creditors of Lake Sulphite Pulp Company, Ltd., has been issued by F. H. Barlow, master, as a result of proceedings before the supreme court of Ontario. As a result of the sale of assets to Brompton Pulp and Paper Company debenture stock of Brompton to an amount of $475,000 was allotted to secured creditors of Lake Sulphite Pulp, on a basis of $27.97 of recognized claims of $1,698,253, with four months of interest payments. Included amongst secured creditors' claims were those of the note holders.

The official dividend sheet of unsecured creditors shows total claims of $584,401. An amount of $50,000 in cash was distributed to this list of creditors on a basis of 8.556% of claims.

The report of the master refers to various settlements that were arranged. These include one of $19,000 for indebtedness of a subsidiary, Nipigon Corporation, Ltd., to the Hydro-Electric Power Commission of Ontario. The claim of the Hamilton Bridge Company was settled on a secured creditors' basis for $59,822; John Stadler was allowed a secured claim for $57,323 and an unsecured claim for $99,230.

New York Paper and Pulp Market Review

Some Improvement In Demand For A Few Grades of Paper Is Currently Reported In the Wholesale Market — Pulp Market Is Relatively Quiet—Mill Buying of Roofing Rags and Old Rope Steady.

Office of the PAPER TRADE JOURNAL.
Wednesday, September 2, 1942.

Indications of an improved demand for some major grades of paper is reflected in reports received from many manufacturers' representatives, jobbers, and general paper merchants this week. Orders from consumers dropped to a relatively low level during mid-summer. This tapering off in demand has also been reported in other important markets. In view of the great changes taking place in the national economy, demand for civilian goods in large variety has declined to approximately the level of the depressed years. With the production of military supplies in large variety steadily expanding, the consumption of most non-durable goods for civilian uses must inevitably decline further. The great utility of paper and the increasing uses found for it, should continue to exert a strong effect to maintain demand, despite the severe restrictions imposed upon the industry by the demands of war.

The index of general business activity declined to 131.6% for the week ended August 22, from 132.9% for the preceding week, compared with 130.7% for the corresponding week last year. Paper board output was 4.1% lower.

Paper production for the week ended August 22 was estimated at 80.5%, compared with 102.8% for 1941, with 74.0% for 1940, with 83.3% for 1939, and with 80.1% for the corresponding week for 1938.

Paper board production for the week ended August 22 was 74.0%, compared with 94.0% for 1941, with 74.0% for 1940, with 72.0% for 1939, and with 69.0% for the corresponding week for 1938.

Reports at this date indicate somewhat more activity in the wholesale market in a few lines of paper, such as sulphite bonds and in kraft. A moderate improvement is expected in the industry and trade, with the long view uncertain and unpredictable.

Wood Pulp

The chemical wood pulp market continues to reflect an easy supply situation. Prime grades of bleached and unbleached sulphite are relatively scarce. Other grades of pulp are apparently adequate for the lower production now in effect. Prices are unchanged.

Rags

Demand for old cotton rags is reported good at this date. Prices are quite firm with ceiling prices well maintained.

Mill buying of cotton cuttings is relatively light at this date. No. 1 white shirt cuttings are currently quoted at 7.00; No. 1 silesias, at from 5.00 to 5.75; new unbleached, at 7.00; blue overall, at from 5.75 to 6.00; fancy, at from 3.50 to 3.75; washables, at from 3.00 to 3.25, and mixed khaki cuttings, at from 3.50 to 3.75.

Old Rope and Bagging

Demand for old Manila rope continues steady, with mills paying the ceiling price on No. 1 Manila. Sisal strings are currently quoted at from 4.00 to 4.25, and mixed strings at from 1.50 to 1.75.

Trading in scrap bagging is on the limited scale which has prevailed for some time. No. 1 domestic gunny is currently quoted at from 4.50 to 4.75.

Old Waste Paper

No important change in prices or demand has been reported in paper stock during the current week. Trade reports from some quarters reflect the opinion that a material improvement in the waste paper market will follow the improvement in paper consumption reported in the printing and allied trades. Nevertheless, the prospect for a substantial improvement is apparently not very bright at this date.

Twine

No important change in prices or demand has been reported in the twine market this week. The high bid on twines for the U. S. Post Office accumulations in New York, for the last quarter of the current year, was $3.77 per cwt.

Heads Charles F. Hubbs & Co.

A special meeting of the directors of Charles F. Hubbs & Co. was held on August 13, being the first meeting held since the death of Charles P. White, president of the company. At this meeting the following resolution was passed:

"With profound sorrow, this Board formally records the death of Mr. Charles P. White, who passed away in Stamford, Connecticut, on April 7, 1942. Mr. White had served this company as director continuously since his election on February 2, 1912, and had served continuously since February 26, 1936, as its President. As co-workers, the members of this Board feel deeply the loss of his wise counsel, unswerving integrity and loyalty. His ready wit, and sparkling humor endeared him beyond measure."

The vacancy in the directorate caused by Mr. White's demise was filled by the election of Charles J. Slicklen. The board then elected the following officers: Richard C. Kettles, Jr., president; Charles J. Slicklen, vice-president; H. W. Doremus, vice-president and secretary; Kenneth Lyons, vice-president; Lowell J. Whiteford, treasurer; Leslie A. Hughes, assistant secretary.

Correction in Wood Pulp Order

WASHINGTON, D. C., September 2, 1942—Duplication of a phrase in one section of General Preference Order M-93, which regulates shipment of wood pulp, has been eliminated by a correction.

A section in Amendment No. 2 to the order, issued Aug. 17 and dealing with intra-company deliveries, was found to contain the same phrase twice. The correction order simply eliminates the surplus wording.

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Pure Titanium Dioxide

UNITANE-O

A brilliantly WHITE, pure, fine titanium dioxide possessing excellent . . .

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- **BRIGHTNESS**
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Suitable for ALL types of paper ranging from thin printing papers and waxing tissues to coated book and magazine stocks.

UNITANE O—110 was especially developed for paper pigmentation. Its excellent dispersion in water promotes good retention and excellent sheet formation. As a component of the beater furnish, it produces *whiter* sheets of *great brilliance*, and superior printing qualities.

SAMPLES of UNITANE O-110 will be sent promptly upon request.

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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, September 2, 1942.

BLANC FIXE—Prices on blanc fixe are firm and unchanged and conform to prevailing market levels. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton, f.o.b., works. Demand reported good for the week.

BLEACHING POWDER—Quotations on bleaching powder are firm. Demand reported moderate for the week. Bleaching powder is currently quoted at $2.25 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are higher for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at 17½ cents per pound; 80-100 mesh, at 18 cents per pound. All prices in bags, car lots. Argentina casein, 20-30 mesh, is currently offered at 10 cents per pound, c.i.f. No quotations on French casein.

CAUSTIC SODA—Quotations on caustic soda continue unchanged at prevailing market prices. Demand reported fair. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, car lots, at works.

CHINA CLAY—Prices on china clay are firm and conform to prevailing market levels. Demand reported fair at this date. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay at from $12 to $22 per ton, at mines. Imported clay is currently offered at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine are firm and unchanged. Market strong. Government demand is reported heavy during the current week. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm for the week with higher prices on some grades. "G" gum rosin is currently quoted at $2.98 per 100 pounds, in barrels, Savannah. "F" wood rosin is currently quoted at $2.97 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is quoted at $3.32 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand fair for the current week. Domestic salt cake is currently quoted at $15 per ton, in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $16 per ton on imported salt cake is nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market levels. Demand reported fair for the week. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are firm and are reported unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported light for the current week. The commercial grades are currently quoted at from $1.15 to $1.25; iron free at from $1.75 to $1.85 per 100 pounds. All prices in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and conform to prevailing market levels. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mines. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	$5.00	@	—
No. 1 Wrapping	4.75	"	—
Standard Wrapping	4.50	"	—
Standard Bag	4.125	"	—
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.05	"	—
White No. 1½	1.00	"	—
White No. 2	1.00	"	—
Anti-Tarnish M. G.	.95	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.35	"	—
Bleached, Jr.	2.65	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50
Boards, per ton—			
News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*60.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$40.25	@ $47.25	$41.40	@ $48.50
100% Rag	32.20	" 37.75	33.35	" 39.25
85% Rag	....	"	32.20	" 37.75
75% Rag	24.75	" 29.00	25.90	" 30.50
65% Rag	....	"	22.80	" 27.75
50% Rag	18.70	" 22.75	19.90	" 24.25
25% Rag	16.40	" 20.00	17.55	" 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55	@ $12.75	$11.70	@ $14.25
No. 2	9.65	" 11.75	10.80	" 13.25
No. 3	9.20	" 11.25	10.35	" 12.50
No. 4	8.90	" 10.75	10.05	" 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper.

Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$13.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00
Unbl. Softwood Sulphite	64.00 @ 66.00
Bl. Hardwood Sulphite	73.50
Unbl. Hardwood Sulphite	63.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich	72.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate	82.00
S. Semi-Bleached Sulphate	75.00
N. Unbl. Sulphate	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	66.00
Unbl. Soda	62.00
Groundwood	46.00

Transportation Allowances Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum price.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1.	8.00	@	8.25
Silesias No. 1.	4.50	"	4.75
New Unbleached	8.00	"	8.25
Blue Overall	5.75	"	6.00
Fancy	3.00	"	3.25
Washables	2.50	"	2.75
Mixed Khaki Cuttings	2.50	"	2.75
O. D. Khaki Cuttings	3.00	"	3.15

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In these days of unusual conditions in the paper mills, Engineers and Superintendents continue to put full dependence on TENAX FELTS.

TENAX FELTS have the record of standing up under continuous operation. Also when the paper mills are not operating continuously. This latter condition applies especially during the summer months.

TENAX FELTS give service and keep felt costs down under all conditions. Try them!

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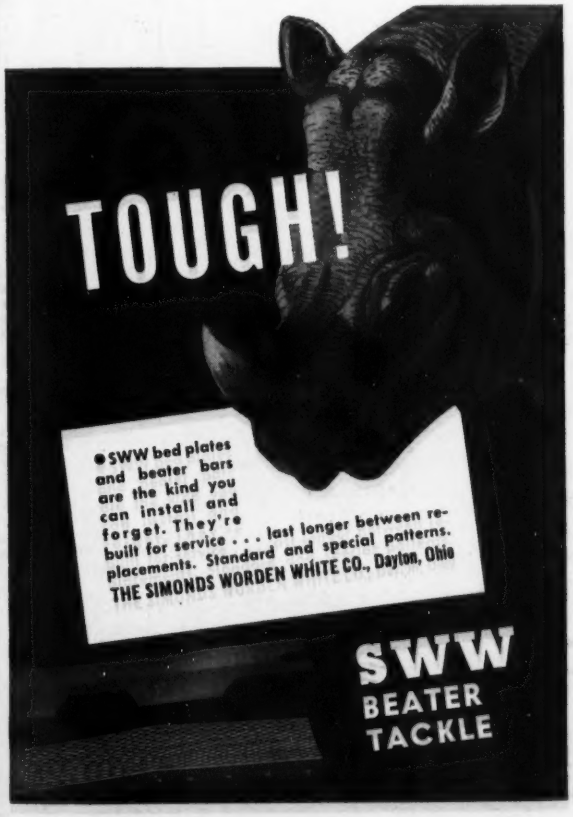
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KRAFT LINER BOARD
BLEACHED SULPHITE AND SODA PULP
BLEACHED AND UNBLEACHED KRAFT PULP

MILLS:

Mechanicville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Cass, West Virginia
Charleston, South Carolina

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
* Old Manila Rope	5.75	"	—

*OPA Maximum Prices.

Foreign Rags

All prices nominal

New Rags			
New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25
Old Rags			
No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.00	@	4.25
Wool Tares, light	4.25	"	4.50
Wool Tares heavy	4.50	"	4.75
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	4.25	"	4.75
Sisal Strings	3.25	"	3.75
Mixed Strings	1.10	"	1.20

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Mixed Books	1.07½	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	1.75	"	—
Old Corrugated Containers	1.00	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 2 Mixed Paper	.70	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1	.07¼	@	.07½
New White No. 2	.04½	"	.05
Light Silesias	.04½	"	.04¾
Silesias, No. 1	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached	.07¼	"	.07½
Washable Prints	.03¾	"	.03½
Washable No. 1	.02	"	.02¼
Blue Overall	.04½	"	.05¼
Cottons—According to grades—			
Washable shredding	—	"	.01¼
Fancy Percales	.03¼	"	.03½
New Black Soft	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.	.03	"	.03¼
No. 2 Mixed	.02¼	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas	.04¾	"	.05¼
New Black Mixed	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope	3.75	"	—
Mixed Rope	.75	"	1.00
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Overissue News	.85	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old Corrugated Containers	1.00	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	4.10	@	4.40
Sisal Rope	4.50	"	5.00
Mixed Rope	1.35	"	1.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.00	"	4.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.75	"	5.00
Jute Carpet Threads	3.25	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	4.50	"	—
Scrap Sisal	4.50	"	5.00
Scrap Sisal for Shredding	4.75	"	5.25
Wool Tares—			
Foreign	(nominal)		

Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

Old Rags

Domestic	5.00	"	5.75
Aust. Wool Pouches	4.75	"	5.00
New Burlap Cuttings	5.25	"	5.50
Heavy Baling Bagging	4.50	"	5.00
Paper Mill Bagging	2.50	"	3.00
No. 2 Bagging	1.35	"	—*

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¾	"	.05
New White No. 1	.06½	"	.07¼
New Light Flannelettes	.06	"	.06¼
Canton Flannel, Bleached	.06½	"	.07
Underwear Cutters, Bleached	.06½	"	.06¾
Underwear Cutters, Unbleached	6.50	"	6.75
Silesias No. 1	.06	"	.06¾
New Black Silesias	.03¾	"	.04
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.07	"	.07¼
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.03¾	"	.04
O. D. Khaki	.04	"	.04¼
Corduroy	.03½	"	.03¾
New Canvas	.07	"	.07½
B. V. D. Cuttings	.07¼	"	.08

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
* Old Manila Rope	5.75	"	—

*OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.50	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
No. 1 Roofing Rags	1.55	"	—
No. 2 Roofing Rags	1.45	"	—